REPORT RESUMES

ED 013 058 FL 000 552

INTERDISCIPLINARY RESEARCH SEMINAR IN PSYCHOLINGUISTICS.
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TUFTS UNIV., MEDFORD, MASS.

PUB DATE 61

CONTRACT OEC-SAE-9494
EDRS PRICE MF-$0.50 HC-$3.68 92P.

DESCRIPTORS- *LANGUAGE RESEARCH, *PSYCHOLOGICAL STUDIES, *LANGUAGE INSTRUCTION, *SECOND LANGUAGE LEARNING, *PSYCHOLINGUISTICS, PSYCHOMETRICS, FLES, BIBLIOGRAPHIES, CONFERENCE REPORTS, TUFTS UNIVERSITY,

COOPERATION AMONG THE FOREIGN LANGUAGE SPECIALIST, THE PSYCHOLOGIST, AND THE EDUCATION SPECIALIST IS ESSENTIAL TO SUCCESSFUL RESEARCH IN THE QUEST FOR MORE EFFECTIVE METHODS OF LANGUAGE TEACHING. EIGHT PAPERS, PRESENTED AT A TUFTS UNIVERSITY SEMINAR DURING THE SUMMER OF 1961, ARE COLLECTED HERE IN A FINAL REPORT AND RELATE EACH PARTICIPATING MEMBER'S SPECIAL FIELD TO THE PROBLEMS OF FOREIGN LANGUAGE LEARNING AND INSTRUCTION. REPRESENTING THE PSYCHOLOGY DEPARTMENT ARE PAPERS ON "PSYCHO-ACOUSTICS OF SPEECH" BY A. WILLIAM MILLS, "LEARNING THEORY, LANGUAGE DEVELOPMENT, AND LANGUAGE LEARNING" BY BERNARD W. HARLESTON, "ONTOGENETIC DEVELOPMENT OF LANGUAGE" BY DOROTHEA E. JOHANNSEN, "SEMANTIC AND SYNTACTIC DEVELOPMENT" BY ZELLA LURIA, AND "PSYCHOMETRICS IN SECOND LANGUAGE LEARNING" BY A. LUCILLE PALUBINSKAS. "RESEARCH ON FOREIGN LANGUAGE INSTRUCTION" IS BY DANIEL W. MARSHALL OF THE EDUCATION DEPARTMENT. FROM THE ROMANCE LANGUAGES AND CLASSICS DEPARTMENTS ARE PAPERS ON "A PSYCHOLINGUISTIC RATIONALE FOR FLES" BY SEYMOUR O. SIMCHES AND JOSEPHINE R. BRUNO AND "STRUCTURAL LINGUISTICS" BY FRANK P. JONES. THE PAPERS ALSO GIVE SUGGESTIONS FOR AREAS IN NEED OF FURTHER RESEARCH AND INCLUDE BIBLIOGRAPHIES. (SS)

ED013058

TUFTS UNIVERSITY

Seminar in Psycholinguistics

FL 000 552

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INTERDISCIPLINARY RESEARCH
SEMINAR ON PSYCHOLINGUISTICS

Tufts University

Summer 1961

Sponsored by U. S. Office of Education
Language Development Program
O. E. Contract SAE - 9494
U. S. Department of Health, Education and Welfare

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INTRODUCTION

The "research on more effective methods of teaching... (modern foreign) languages..." authorized by section 602 of the National Defense Education Act requires more specialized knowledge than that ordinarily possessed by the foreign language teacher. The development of learning theories pertinent to the acquisition of foreign language skills requires the cooperation of the psychologist and the specialist in education.

The need for cooperative activity to approach profitably problems of research in foreign-language learning was the purpose of the Interdisciplinary Research Seminar on Psycholinguistics and Foreign Language Teaching conducted at Tufts University during the summer of 1961.

Nine members of the Tufts Faculty took part in the Seminar which met for three hours once a week for seven weeks (July 5 through August 18).

Six members of the Seminar were from the Department of Psychology; one from the Department of Education, and two from the Department of Romance Languages. Participating members read papers relating their special field to the problems of FL instruction. Following the reading of each paper, there was considerable discussion which was incorporated in the final editing of the paper. Other members of the Tufts Faculty as well as the Regional Director of NDEA and the State Foreign Language Supervisor were invited to observe the Seminar and participate in the discussions.

The eight papers, of which this monograph is comprised, constitute the final report of Seminar. Each paper seeks to relate the problem of second-language learning to such specialized areas as child development, tests and measurements and general verbal behavior, and goes on to suggest designs for future research concluding with a critical bibliography.

It is hoped that the papers enclosed in this monograph will be as fruitful to the reader as they were to the participants in drawing attention to the unchartered areas of foreign language learning.

Dorothea J. Crook
Seymour O. Simches

Co-Editors

A PSYCHOLINGUISTIC RATIONALE FOR FLES

Since 1953 when Commissioner of Education Earl J. McGrath vigorously endorsed the study of foreign languages (FL) in the elementary school (FLES), FLES programs have been multiplying rapidly throughout the country. In a recent survey conducted by the Modern Language Association, 8000 schools were reported as conducting some kind of FLES program. Many states which up to four or five years ago had no FLES program whatsoever now boast of an increase of 100 per cent to 200 per cent. In the state of Massachusetts up to four years ago aboutten communities offered FLES; now there are 132. Nationally the increase has been 351.7 per cent.

We would be heartened by these figures if it were not for the fact that a large number of the FLES programs listed in the MLA survey are less than satisfactory. Some programs are little more than extended "club" activities lasting twenty to thirty minutes a week; other programs in the FL are conducted over loud speaker systems during the lunch hour; still others are nothing but songs and games in the FL to amuse the children or to please the parents. One thing that the majority of these programs seem to have in common is that they are conducted by teachers who are frequently unqualified and who have little or no knowledge of the FL they are supposed to teach.

It has been the contention of the authors that no FLES program at all is better than a poor one, and furthermore that a poor FLES program can seriously impair the entire FLES movement. It is a well-known fact that from the beginning many elementary school educators, principals, and supervisors were not convinced of the merits of FLES. For these educators the example of a poor FLES program is sufficient reason to condemn FLES in toto and characterize it as an "educational fad".

It is for this reason that we consider it imperative that a community which desires to initiate a FLES program make every effort to establish an effective one.

What constitutes an "effective" FLES program? While there are doubtless many answers to this question, most of us would agree on at least two basic requirements: (1) that the program be conducted by qualified elementary-school teachers who are able to understand and speak the FL they are teaching; (2) that the program be continuous, i. e., carried into the junior high and senior high schools.

In our opinion, it is not possible for programs which do not satisfy these two minimal demands to succeed. We would even go on to add a third requirement. It is our feeling that for a FLES program to be successful it must be based on sound psycholinguistic principles, i. e., it must have both a linguistic and a psychological rationale.

The science of linguistics is relatively new, and its application to FL teaching is even more recent. Nevertheless, particularly at the FLES level where primary emphasis is placed on speaking the FL, the application of linguistic principles is vital. This is further justified in view of the fact that the linguistic method conforms with the most recent theories on the psychology of learning. The purpose of this paper will be to discuss the application of linguistics to the teaching of FLES and its relationship to the psychology of learning.

We will illustrate the application of linguistics to the skills of understanding and speaking a FL, and we will conclude by presenting areas for further investigation and study.

Linguistics and psychology are closely related because of the very nature of language and the way it is learned. Hockett in his Course in Modern Linguistics suggested this when he said, "A language is a system of habits". Although the linguists have dealt essentially with descriptions of languages, their structure, their dialects, and their history, they have also developed a considerable body of knowledge about language in general and how it is learned. Since the second World War, linguists have made important contributions to the field of FL learning. Bloomfield's idea that "language learning is overlearning" was the key to the ASTP method of learning FL with its extensive use of mimicry and memorization. Fries of Michigan University saw the further pedagogic relevance of comparing scientifically one's native language with the FL to be learned. For him language learning is the mastery of those essential patterns that constitute the structure and sound system of a language. A native speaker has acquired these patterns early in his life as a set of unconscious habits. However, as a second-language learner, he must make the patterns of the new language as automatic as those he has already acquired. Linguists have realized from the very beginning that language is behavior and that behavior can be learned only by inducing the student to perform in the language. Linguists make a distinction between performing in the language and learning about the grammar of the language. They do not mean necessarily that rules of grammar and terminology are unnecessary, or that they should be dispensed with; they do mean that rules cannot take the place of performance.

Any good or effective FLES program must take into account this knowledge concerning second-language learning derived from linguistic research. Of particular importance are two principles which are inherent in the nature of language itself: (1) a language is an elaborate system of patterns and the patterns of one's native language interfere with the learning of the patterns of a second language; (2) language is learned through the acquisition of habits.

In regard to the first principle stated, that one's native language interferes with the acquisition of a new one, it is important to note that this degree of interference varies according to many factors. For example, a bilingual child has relatively little interference from either language. There is, however, a great deal of interference in the case of a child who takes up a study of a foreign language at a later age. The bilingual child can respond to stimuli in both languages rapidly and interchangeably with very little difficulty. In the case of an Italian immigrant family, for example, when the mother speaks to her child in the native tongue, he automatically responds to her in Italian; while on the other hand, when his brother or sister speak to him, in all probability he will reply in English. This is due, no doubt, to the associational stimuli which have been established in the bilingual child from birth. But in the case of a child who learns a second language some years after he has acquired the first, the associational stimuli do not exist, and they become more difficult to acquire. Thus a child in response to a familiar object stimulus will use the word he has first learned from that stimulus. When he is shown the object book, he will say "book". Every time the object is brought forth, the response will be the same. The constant association makes it possible for the word "book" to take the place of the object itself. The child is able to conceptualize the term. But in the learning of a second language, this process is not so simple because the child has already learned one linguistic symbol for a particular stimulus. When the stimulus book is presented, he will think first of "book", and only secondarily of "le livre" or "el libro". Therefore, we may conclude that the response is derived not merely from the stimulus itself but is also identified with the meaning of the object in the native language. This constitutes "interference", perhaps the most important deterrent in learning a second language. Any FLES program which is to be effective, must attempt to reduce these points of interference as much as possible.

The second principle of language learning which we stated above is that language is acquired through habit. This implies that it must be taught by producing appropriate stimuli and responses. In this response kind of learning, we must also remember that in order to be learned a response must be performed; moreover, the response is learned more effectively when it is immediately rewarded. (By "reward", we mean that kind of satisfaction the individual receives as a result of what he has performed.) For example, a baby makes a series of noises which conveys to his parents the idea that he wants water; his parents give him water, repeating the word many times. Eventually the child succeeds in saying "water" or "wa-wa" and is immediately rewarded.

The type of behavioristic conditioning described above is important to all FL learning. It is particularly applicable to the elementary school as a longer span of study is provided making more time available for the acquisition of new linguistic habits. Furthermore, in the elementary grades the mind is still flexible enough to acquire patterns of the new language without too much interference from the mother tongue. Lastly, that automatization so necessary to acquire language habits may be a monotonous procedure for older children but is very well suited to children in the elementary school. Instead of being bored, they seem to find a certain satisfaction in drilling and repeating the same thing over and over again.

A variety of methods have been tried in the teaching of FLES since its inception; however, it is our feeling that the method which best incorporates the linguistic and psychological principles we have been discussing is the so-called "Dialogue Method". This method consists of eight different steps:

(1) exposition of the dialogue
(2) presentation and learning of the basic dialogue
(3) supplement to the dialogue
(4) dialogue adaptation
(5) directed dialogue
(6) structure drills
(7) pattern generalization
(8) recombination narrative

Exposition consists of a descriptive statement in English by which the teacher introduces and explains the situation described in the dialogue. The basic dialogue follows. By "basic dialogue", we mean one in which there is a speaker, a hearer and a real situation. It forms the core of each unit of study and the point of departure for all subsequent drills. It is usually the recreation of a natural experience a child might encounter in his daily life. The vocabulary and patterns in the FL are the kind a foreign child is likely to use in everyday speech. The language emerges from the situation itself and the learner is able to form a direct association between the language and the situation. The language of the dialogue is not oversimplified but is usually geared to the age and intelligence of the child. For example, a French child does not wait until he is in the second year of high school to use the subjunctive. Therefore, a subjunctive might well be encountered in a first or second FLES dialogue.

For the dialogue to be immediately useful, it is memorized. Sentences from the dialogue then serve as patterns in which vocabulary or structural items can be substituted. The development of an increased skill in making these substitutions provide a series of building blocks to eventual fluency in the spoken language.

Once the dialogue has been learned, supplemental items and useful expressions may be introduced to vary and enrich the dialogue content itself. This step is followed by "dialogue adaptation" which integrates the dialogue situation within the personal experiences of the students. If a particular dialogue tells about Juan and Pablo who have a cat or dog, in the "dialogue situation", the teacher may question her students about their cats or their dogs, thus personalizing the experience. This step provides for the transfer of learning to new situations and takes the language outside of the immediate confines of the classroom.

The fifth step is the "directed dialogue". This is controlled conversation between students in which the conversation is guided and stimulated by the teacher. The purpose is to combine in different ways structural patterns and vocabulary items which have already been learned. For example, the teacher says, "Henry, tell Helen that she is tall". Henry answers, "Helen, you are tall". This technique not only involves drill and structural patterns but real-life situations.

This step is followed by pattern generalization, i. e., a series of statements in English which analyse or focus the attention on structural changes which have been previously learned through pattern drill. (This step comes after pattern practice, rather than before it.)

The final step, called "recombination narrative", provides the opportunity to use basic materials learned in dialogues in a different context and in a different form. The dramatic form of the dialogue is changed to the third person narrative. What was previously acted out is now retold. An advantage of the recombination narrative is that it acquaints the student with the style of narrative language and prepares him for reading.

The "dialogue method" which we have described, seems to us sound, both from a linguistic and a pedagogical point of view. First of all, it provides for "over-learning" through mimicry and memorization. It also provides for the mastery of the sound system of the target language and of those essential features which constitute the structure of the language. It involves structural manipulation which leads to automatization. Furthermore, through the dialogue, the child builds up a supply of natural utterances in the FL taken from real situations; and the possibility of making errors by translating is reduced. Most important of all, the dialogue furnishes the child with a store of practical utterances by which he may communicate his basic thoughts and desires. He is thus provided with the essential factor in motivating the study of FL's: immediate reward!

As helpful as linguistics and psychology have been in suggesting certain methods to be followed in FLES instruction, there are still many problems facing the FLES teacher which have to be solved. These disciplines have not yet given us the answer to such questions as: Who should study a FL in the elementary school? At what age and in what grade is it best to begin FLES? When should reading and writing be introduced in a FLES program? How do we proceed from the spoken utterance to the written word? Some research has been done in this last area, but psycholinguists still have much to tell us about the learning of reading and writing in the FL at this level.

Most important of all we still need to have tangible evidence demonstrating the merits of FLES scientifically. We must prove through controlled studies that a pupil who has had FLES has indeed acquired a greater mastery of the sounds and structures of the FL than a pupil who has studied the FL only at the secondary level.

We have been convinced for many years of the value of starting FL study in the elementary schools. Some of the reasons which have led us to this conclusion have been explained in this paper. Most of our contentions regarding FLES have already been borne out by subjective observation. It remains only for us to establish our contentions by rigorous and scientific studies. It is to this end that we now call upon psychologists and linguists to bend their efforts.

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Recommends a continuous program which begins earlier and thus brings pupils into contact with a sound language experience at an age early enough to avoid the handicap of fixed language habits.

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STRUCTURAL LINGUISTICS:

Structural Approaches to American English and Classical Latin

I. The Concept of Structural Linguistics.

Pei and Gaynor's definition of structural linguistics as "Linguistic study in which each language is viewed as a coherent, homogeneous entity" (18) may profitably be expanded to comprise the following principles:

1. It is descriptive. Structural linguistics is based on the systematic observation of individual languages, with the help, if possible, of a native informant. The structural linguist works (as far as he is able) without any a priori assumptions about the nature of the language he proposes to study but arrives at its rules of structure inductively by Baconian methods.

2. It is "synchronic." For descriptive purposes it ignores history and linguistic change, confining attention to relationships existing within a very thin slice of time. The slice of time best suited to structural analysis is the present; it is only with reservations that the method can be applied to the past.

3. Its primary concern is with the spoken language and with "usage" rather than what is correct. Structural linguistics follows the principle that the spoken word came before the written and that it is through the spoken word that a new language should be approached, even when (as in classical Latin or Greek) the spoken language is no longer in use. Its rules derive from the way people actually talk not from the way "authorities" tell them they ought to talk.

4. It seeks its own laws, not laws taken over. Language was once thought to exemplify some system, such as the philosophy of Plato or the psychology of Wundt, and it was according to the laws of this system that the language student interpreted the data which he collected. The structural linguist does not consider himself bound by any laws except those of the language itself.

5. It stresses the differences rather than the similarities between languages. The structural linguist is interested in what is unique in a language, and this interest carries over to the differences between geographical

districts, social classes, "in groups" and "out groups", and other speech communities.

6. Its categories are based on form rather than meaning. In structural linguistics criteria of form and pattern are used to determine the function of words. It is the patterning of a language that gives it its unique character. Perception of pattern is given priority over analysis of meaning.

7. It strives to avoid translation and to deal directly with meanings. The structural linguist believes that the learning of a new language should be similar to that of a child in learning his own.

II. Historical Background.

The structural approach appeared very early in the history of grammar. Panini's treatise on Sanskrit was written around 300 B.C. with the purpose of preserving the purity of upper-caste speech. This remarkable document, which gives a full and detailed description of the language, is based not on theory but on patient, thorough observation of Sanskrit forms and sounds. According to Leonard Bloomfield (3) "no other language to this day has been so perfectly described."

Unfortunately, the tradition of Sanskrit grammar was unknown in Europe until late in the 18th century. Greek grammar, by contrast, was philosophical rather than scientific. Its categories of case, number, and the like, useful as they were for classifying linguistic phenomena, were set up as abstract entities according to the supposed meaning of the class. Even the Epicureans, who explained language in an evolutionary framework, arrived at their explanation by abstract reasoning rather than by induction.

Latin grammars were written on Greek models, with Latin presented as the logically normal form of human speech. Norms were set up from a study of classical authors. Departures from these norms, when they were found in medieval Latin and the vernacular languages, were taken as examples of "linguistic decay",--of degeneration from an earlier and better model.

The scientific study of language as a natural phenomenon did not begin until the late eighteenth or early nineteenth century. The chief influence was natural science, especially comparative anatomy and the theory evolution. The discovery of Sanskrit grammar and the newly awakened interest in modern languages turned linguists in the direction of historical and comparative studies. The great achievements of the period were (1) to establish the principle of the regularity of linguistic change, and (2) to organize the Indo-European languages into a unified and coherent system.

In their enthusiasm for comparative and historical studies linguists at first found little time for the accurate and detailed descriptions which the structural approach demands. Only in the 20th century as they turned their attention to the study of American Indian languages, where the historical approach is impossible, did the desirability of purely descriptive studies become apparent.

Sapir and Bloomfield are the great names in the first part of this period. Both were students of Indian languages. Sapir's Language appeared in 1921. The Linguistic Society of American was founded in 1925. Its periodical, Language, in its first number carried a brief but important article by Sapir on "Sound Patterns in Language," (21) an article which helped to establish the concept of the phoneme and the significance of "patterning" in language studies. Bloomfield's Language (1933) is in my opinion the best introduction to linguistics in general and to structural linguistics in particular. It is thorough, lucid, and well organized; it is also intensely readable. Carl Darling Buck's Comparative Grammar of Greek and Latin, which came out in the same year, sets forth the principles of linguistic science from the point of view of the classical scholar. Another great name from this period is that of Otto Jespersen. His Analytic Syntax (1937) is a brilliant attempt to express all grammatical relations by a system of letters, numerals, and supplementary signs analogous to the systems of mathematics and chemistry. Though Jespersen in this book drew all of all of his examples from eleven European languages (including Finnish) he believed that his system would prove useful in comparing the grammatical structures of other languages.

World War II with its sudden demand for personnel trained in little-known languages gave a great impetus to the structural approach. Bloomfield wrote his Outline Guide for the Practical Study of Foreign Languages (1942) in order to provide techniques for working with a native informant. Bloch and Trager's Outline of Linguistic Analysis, which was also published in 1942, gives a summary of these techniques. The authors claim no originality for their general principles. They have, however, written a useful guide book to structural linguistics. Zelig Harris' Methods in Structural Linguistics (1951) sets out to "define the operations which the linguist may carry out in the course of his investigations." In his strictly operational approach Harris has written a treatise for the specialist, not a book for the general reader. Better suited to the interests of the general reader is George Miller's Language and Communication (1951), which brings structural linguistics into the broader framework of information theory.

III. Terminology.

Like other sciences, structural linguistics has developed a terminology of its own. Some of these terms, unfortunately, do not seem to serve any purpose except to irritate outsiders and mark the user as the member of an inner group. To use "transitival" instead of "transitive" or "perfective" instead of "perfect" adds little to science while turning away scholars who might otherwise be sympathetic with the structural approach. Some of the terms, however, are more than jargon. They further communication and make for greater precision of thought. From them I have singled out a few which seem both typical and useful.

Utterance. The term "utterance" was adopted by structural linguists to describe any unit of cannected speech whether or not it is a "sentence." It is "any stretch of talk, by one person, before and after which there is silence on the part of the person." (12) Utterances may range in length all the way from a simple interjection like "Oh, Oh," to a sentence by Faulkner or Proust. Some writers use "major" for utterances with a verb and "minor" for utterances without. Structural linguists do not reject the term "sentence". They prefer utterance, however, because it does not involve them at the start in questions of meaning or of what is "correct."

Pattern. Pattern may be defined as a characteristic arrangement in time of the elements - the sounds and forms - of a language. Again, the linguist is able to set up criteria without first having recourse to meaning. By the use of differences in pitch, stress, inflection, order of words, the pattern of an utterance may be changed. Patterns are arbitrary. They have no meaning in themselves, but because of the great range of formal differences which they comprise they can be used to convey an almost infinite variety of meanings.

The word "pattern" is used as an intransitive verb by structural linguists, who might say that a certain word "patterns with the accusative case". I believe that this usage is more than jargon. It conveys a distinction which the conventional expression does not make.

Phoneme. Physiologically, the number of distinct sounds that can be articulated by human speech organs is very great. Identifying and transcribing these sounds is the province of the phonetician. Phonetics, however, plays only a small part in structural linguistics. In describing a language it is necessary to identify only those differences in sound that are significant for conveying meaning. A cluster of closely related sounds that are never contrasted with each other is called a "phoneme." The separate sounds that make up the cluster are called "allophones." What is an allophone in one language may be a distinct phoneme in another. An example that is frequently cited is the sound of /p/ in the English words "pin" and "spin". Phonetically, the two p's are distinct in sound and in some languages (Chinese, for example) are used to convey different meanings. In English, however, the contrast is never made, and to most ears the sounds are the same. On the other hand, English distinguished sharply between final b and final p, as in "cab" and "cap", whereas in German the two sounds are allophones in this position. The number of phonemes in any single language ranges between twenty and sixty. In addition to differences in the articulation of sound, phonemic patterns can be changed by altemations of pitch and stress, and by varying the length of consonants and vowels.

Morpheme. Morphology is the science of "forms" - the formal devices which language uses to indicate differences in meaning and to mark the relationships between words. Structural linguists like the term morpheme to describe such devices. Bloch and Trager divide morphemes into free forms and bound forms. A free form can be spoken alone with meaning; a bound form cannot. An example of a bound form in English is the verb ending, -ed, which indicates past time but can never be used by itself. The proportion of bound forms to free forms varies greatly from language to language. Some linguists use the term allomorph to describe the members of a morpheme which are distinct from each other in form, but can be used interchangeably in conveying meaning. "Hanged" and "hung" would thus be treated as allomorphs for the past tense of "hang".

Syntax. Syntax deals with the principles on which the meaningful parts of a sentence (or "complex utterance") are organized. Bloomfield uses the term "tagmeme" to describe such a principle, e. g. the tagmeme of word order. The other two basic principles by which sentences are organized are "form classes", i. e. morphemes, and "function words" uninflected words which show the relationships among other words in the sentence.

Grammar. Bloch and Trager conclude their treatise with this statement: "When the observer has determined the phonemic structure of a language, and has classified all its constructions, both morphological and syntactic, the resulting description will be an accurate and usable grammar of the language, accounting in the simplest way for all the utterances of the speech community, and presenting the clearest possible summary for the use of students and scientific linguists alike."

IV. Specific Applications.

A. American English.

C. C. Fries of the University of Michigan was active in the structural linguistic movement from the start. Disturbed at the unscientific and unrealistic way English was taught in American schools he set out to determine what "general usage" is and to outline "the types of differences that appear in our American language practices." Recognizing the importance of "Standard English" as an aid to communication he thought it was necessary before defining the standard "to make an accurate and realistic survey and description" of the various language practices that actually prevail in the United States. Fries was the first American linguist to my knowledge who took all of his data from non-literary sources. His American English Grammar (1940) was based on 3000 letters (2000 of them complete) which were taken from U. S. Government files and deposited in the Library of the University of Michigan. All were written in longhand. All were of adequate length for nalysis and study. Information was obtained about the writer - his family background, schooling, occupations, and the like. On the basis of this information Fries divided his material into three classes, mostly according to educational background. The basic categories which he chose for treating his data were: Form words (e. g. nouns and verbs), function words, and word order. Whenever possible he used statistical methods, indicating the relative frequency of each grammatical item within the body of examined material. The language items which he selected served to illustrate how "Vulgar English," which was defined inductively from the examples used in the study differed from "Standard English," which was defined in the same way.

As source material for his next book, The Structure of English (1952), Fries was able to avoid the written word completely. His raw data were 250,000 words of recorded telephone conversations by 300 different speakers. His attitudes toward the data which he had collected in this way he compared to that of the botanist who is more interested in plants as they appear in nature than in specially developed and "more beautiful specimens of the florist's hot house and cultivated garden." Because he was dealing with oral records he was able to set up a number of categories which would not be possible if he were dealing with the written language alone. Among these categories were Intonation, for which he distinguished four levels in American speech.

Fries' work is creative and challenging. His two books make stimulating reading. They are treatises, however, rather than texts. In Patterns of English (1956) Paul Roberts has applied the principles developed by Fries and the structural linguists to the teaching of high-school English. Effectively used, the Roberts text ought to stimulate a feeling for grammar as usage and lead the high-school student to a better understanding of English structure.

B. Classical Latin.

It is fitting that the principles of structural linguistics should at last be applied to the teaching of Latin itself, since it was against the domination of Latin grammar that the linguistic movement began. Latin being a "dead" language it is obvious that some of the principles of structural linguistics cannot be applied to it. You can't, for example, make use of a native informant; and you can't make the fine distinctions in usage which are possible in a living language. Much of the structural approach is feasible, however, and can in my opinion be used with profit.

My objection to the traditional teaching of Latin in American schools is that few students ever attain even a partial mastery of the language. They miss the pleasure, both intellectual and aesthetic, of reading Latin as Latin and fail to perceive its magnificent structure of sounds and forms. Too many of them after four years of study look at a Latin sentence as a collection of verbal symbols to be rearranged and put into bad English. To remedy this situation - to make the learning of Latin more rapid, more interesting, and more thorough - Waldo Sweet and his students at the University of Michigan developed a structural approach to Latin which has attracted a good deal of attention and some controversy in classical circles. Sweet's text, Latin: A Structural Approach, did not appear until 1957, but his method was known and his influence felt for some years before.

Sweet uses linguistic principles and terminology throughout his book. His aim is to teach Latin as Latin, with a minimum of recourse to English. "Pattern practice" structural analysis, and the answering of Latin questions by Latin replies based on the reading take the place of translation. The course is constructed around 360 "basic sentences", - proverbs, epigrams, and pithy sayings taken from many Latin writers, ancient, medieval, and modern. The student is given ten of these sentences to learn by heart at the very beginning of the course. From then on he is exposed to none of the "made Latin" which disfigures the ordinary text book. Instead he uses the basic sentences for pattern practice, by which various features of Latin structure are introduced and repeated until they have been mastered. The method calls for as much drill as the traditional method, but the drill is on whole utterances rather than bare vocabulary and forms. Much of the drill is relegated to the language laboratory where the student can work at his own pace. Vocabulary is reduced to a minimum at the start, and words wherever possible are introduced by pictures instead of by association with English equivalents. Great emphasis is laid on the structure of Latin - its syntax and morphemes - especially those features in which it differs from English. Case is presented in the first lesson. Sweet's treatment of case impresses me as one of the most valuable features of his whole approach. He presents the cases "horizontally" rather than "vertically". That is to say he takes up the cases one at a time in order of their importance, giving all of the forms, the "allomorphs" for each. In the traditional or vertical method the student learns all of the cases at once but learns them one declension at a time, e. g. "puella, puellae, puellae, puellam, puella, a girl, of a girl, to a girl, a girl, from, by or with a girl". Sweet has replaced this meaningless drill with intelligent practice in the use of significant forms. The order in which the various forms and constructions are presented is determined by the frequency with which they are encountered in Latin writers. Sweet has departed from the traditional method in his presentation of verb forms as well as of case. By confining himself to the third person he is able to teach the present and the perfect, the active and the passive almost simultaneously and from the start. In my opinion, this is a great gain. The student is learning how to deal with real Latin sentences at the very beginning of the course. Even if he never goes beyond the first semester he ought to acquire some feeling for the structure of the language, - a feeling which the traditional approach does not give at this early stage.

Classicists are far from neutral about Sweet's approach to Latin. All whom I have consulted are either strongly for it or strongly against it. The views of the latter are cogently expressed by Van L. Johnson (16) and, more vehemently, by Thomas H. Corcoran (6). Some of the objections are directed against Sweet's text itself - the over-use of questions-and-answers in Latin, the proliferation of technical terms, the lack of connected discourse for translation. These, it seems to me, are mannerisms of the author and do not invalidate the method itself. More serious objections have been raised against the whole structural approach on the ground that the traditional, humane values of Latin are lost, that the oral-aural method has no validity for a language that is no longer spoken, and that when treated as an example of linguistic science Latin becomes just another language like Bantu or Tagalog. Johnson objects to the structuralists' insistence on the differences between Latin and English. To him the great value of Latin is its training in English: "It is a training in exactness, subtlety, discrimination, sensitivity in word and thought." All of this, he feels, is lost in Sweet's "direct" method of learning Latin.

The structural linguists, on the other hand, claim that they can teach Latin more quickly, more thoroughly, and more enjoyably. Though few in number they make up for it in enthusiasm. They have used the traditional method and given it up because they find the structural approach more effective. Eleanor Huzar (13) testifies to its practical advantages in the class room. It helps the student, she says, "to learn solid Classical Latin" more quickly, more thoroughly, and with more zest. Richard T. Urban (24) describes an experiment in which he set up two groups of beginning Latin students and taught both groups himself. With one group he used the traditional method in which he had himself originally been trained; with the other he used Sweet's structural approach (though not his textbook). The first group had the higher mean I. Q., (110 against 104 for the experimental group). At the end of a year Urban reported that (1) the experimental group early in the course developed the ability to read Latin correctly while the control group never did; (2) interest and morale was higher in the experimental group; (3) on the final examination, which was identical for the two groups and seems to have been fairly devised, the mean score for the experimental group was 79 against 52 for the control group. Of course, no conclusions can be drawn from a single experiment like this, especially since it seems clear that Urban wanted the experimental group to win. The experiment suggests, however, what can be done with the structural approach by a teacher who is enthusiastic about it. The two other class-room teachers whom I have consulted (1, 7) gave me similar reports: they would not go back to the traditional method of teaching, though they think that more satisfactory textbooks than Sweet's are needed.

My own feeling is that no either-or position need be adopted. Learning to read Latin as Latin seems to me perfectly consistent with the analysis and construing which good translation demands. Sweet and his group have shown that the structural approach can be applied to teaching an ancient language like Latin. How effectively it is applied will, of course, depend on the attitude and ability of the teacher.

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PSYCHO-ACOUSTICS OF SPEECH

Acoustics of Speech

Speech consists of bursts of minute and rapid fluctuations in air pressure. The average sound pressure of ordinary conversation is about three millionths of a pound per square inch. The pressures of the loudest and faintest sounds that contribute to the intelligibility of speech differ by a factor of about thirty. These fluctuations in air pressure contain all of the frequencies that we can hear, but they are not all equally important for understanding what is said. The frequencies between about 200 and 3000 cycles per second (roughly the frequencies transmitted by an ordinary telephone) contain almost all of the "phonemic" information. The presence of other frequencies makes the voice sound more natural, but contributes little to the identification of utterances.

To produce the "voiced" sounds--the vowels and some consonants--the vocal folds are brought together by the muscles of the larynx and forced apart in brief puffs by the pressure of air from the lungs. The vocal folds open and close from 100 to 200 times per second depending upon the sex of the speaker and the intonation of the utterance. This vibration produces a series of strong overtones at integral multiples of the fundamental frequency. The oral cavity acts as a filter which may be tuned to certain frequencies by moving the tongue and lips. Humping up the tongue in the middle creates one resonant cavity in the back of the mouth and rounding the lips creates another in the front of the mouth. Which frequencies are selected and which suppressed depends primarily upon (a) the position (anterior--posterior) of the hump in the tongue, (b) the height of this hump in the mouth, and (c) the degree of rounding of the lips (DeLattre, 1951). Lowering the glottis produces nasal sounds by connecting the nasal cavities to the oral cavities. (Fig. 1)

The vocal folds relax during the "unvoiced" sounds, which are produced by interfering with the flow of air through the mouth by placing the lips, tongue or glottis against or near a fixed part of the mouth or another mobile articulator. These sounds are the unvoiced consonants. Performing the same articulation with the vocal folds together produces the corresponding voiced consonant (compare /s/ and /z/).

Visible Speech

Depicting speech directly as a time-varying pressure makes a series of squiggles quite unintelligible to the eye. A more meaningful visual presentation of speech can be constructed by first analysing these sounds into their component

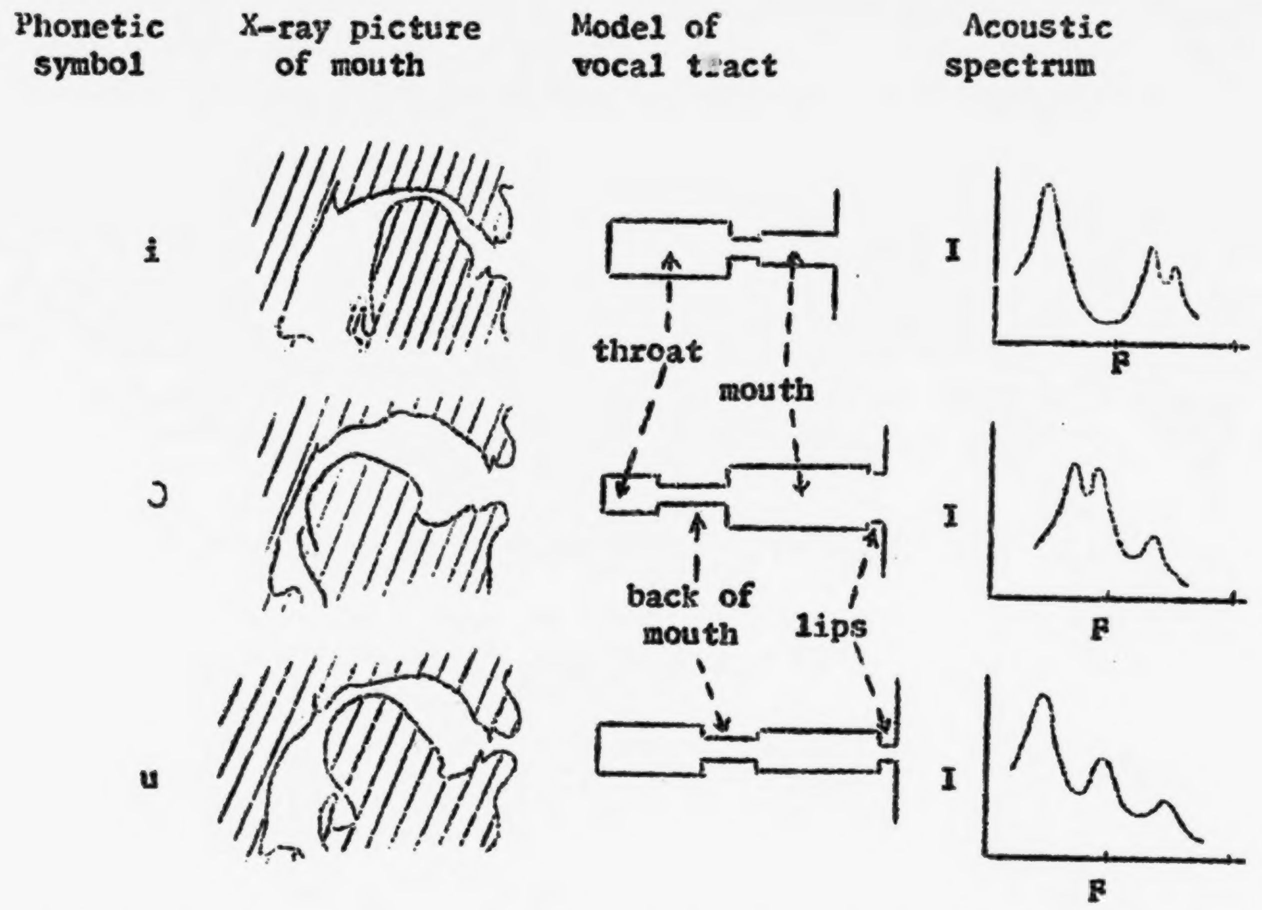

Phonetic symbol
X-ray picture of mouth
Model of vocal tract
Acoustic spectrum
i
ɔ
u
throat
mouth
back of mouth
lips
I
F

Fig. 1. The articulation of three different vowels (Miller, 1951).

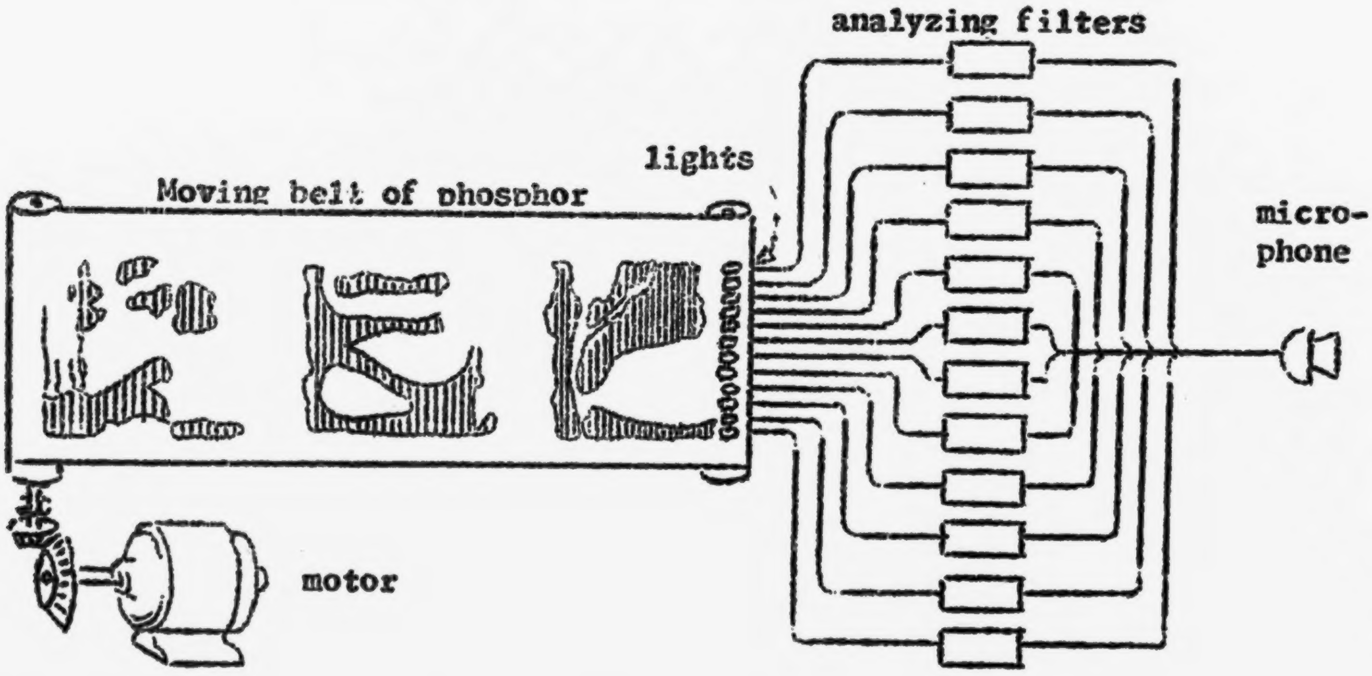
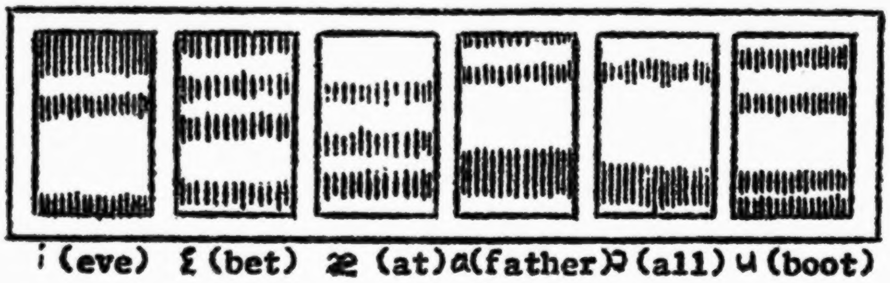
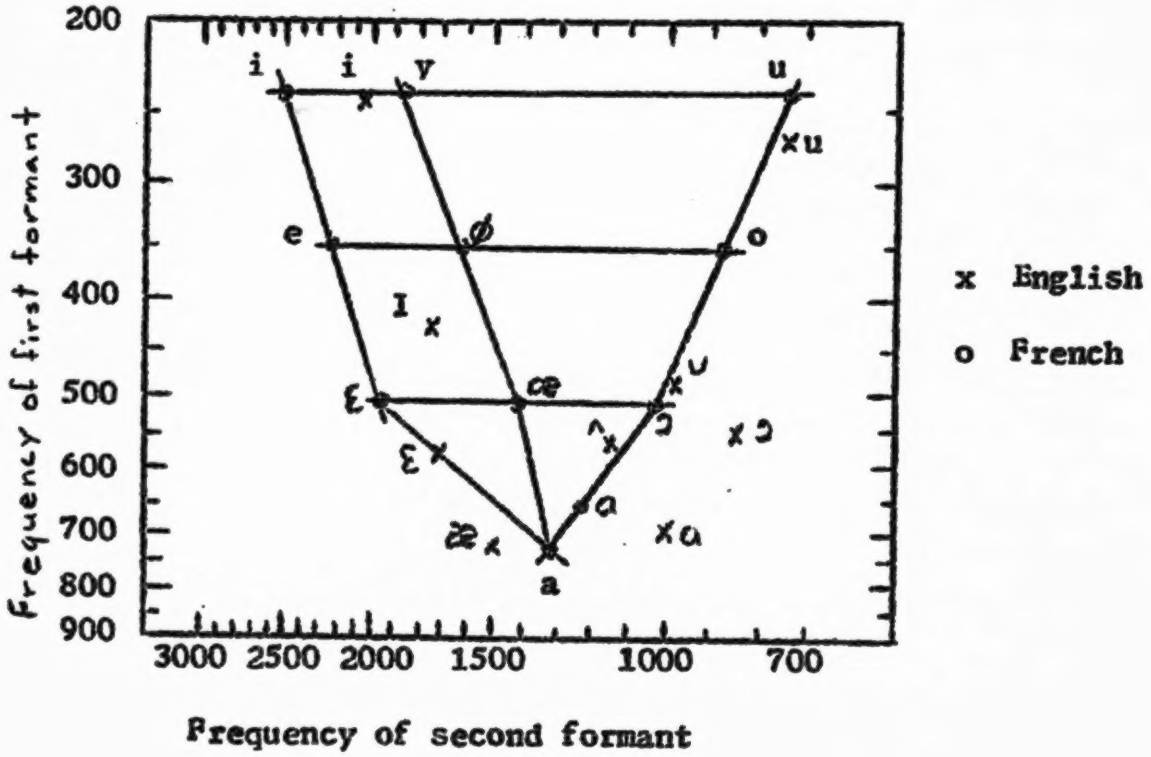

analyzing filters
lights
Moving belt of phosphor
micro-phone
motor

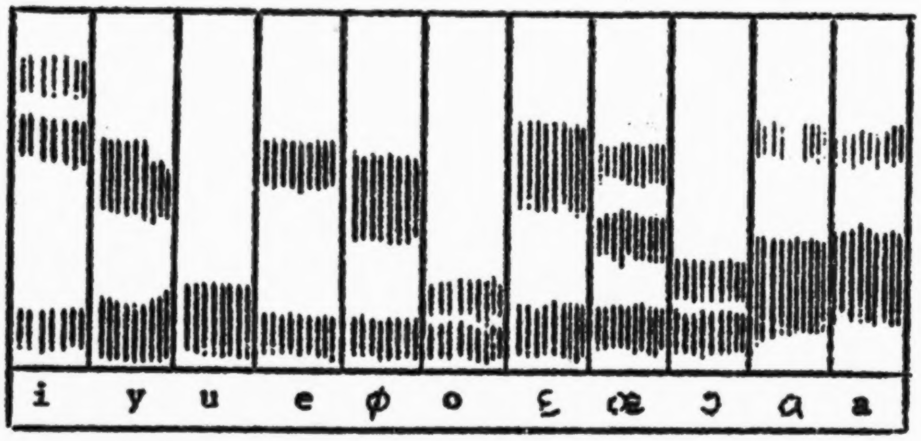
Fig. 2. A speech spectrograph (Potter, Kopp, & Green, 1947).



a) Spectrographs of some English vowels.



b) Comparison of the first two formants of English and French vowels.



c) Spectrographs of French vowels.

Fig. 3. The formants of some English and French vowels (DeLattre, 1948).

frequencies, as the ear does, and then displaying the relative amounts of speech power in different bands of frequencies as a function of time (Potter, Kopp, & Green, 1947). The "speech spectrograph" makes such analyses and displays the result in a three-dimensional picture; the horizontal axis represents time, the vertical axis represents frequency, and the brightness of any spot represents the relative power of one band of frequencies during one interval of time (Fig. 2). The patterns drawn by a speech spectrograph are translations of speech into a visible language that can be translated back into an auditory language if you know the rules.

The simplest rules are those for translating the cardinal vowels. Each vowel produces simultaneously a set of briefly sustained notes whose frequencies are determined by the tuning of the oral cavities. These notes, known as the "formants" of the vowels, appear in the spectrograph as sets of parallel, horizontal bars. The formant with the lowest frequency is called the first formant, the formant with the next highest frequency is called the second formant, and so on. Because no two cardinal vowels have the same first and second formants, it is necessary to specify only the first two formants to identify a vowel. The first two formants of some English and French vowels are compared in Fig. 3. On this kind of a figure the diphthongs of English would appear not as points, as the vowels do, but as directed curves gliding from the position of one vowel toward that of another (Lehiste & Peterson, 1961).

Consonants cannot be translated so easily. Table 1 shows a two-way classification of the consonants of English by the different categories of sound (plosives, nasals, fricatives, laterals and trills) and by the different combinations of articulators that are used to produce them. Where two sounds are listed, the first is unvoiced and the second voiced. Not all of the combinations appearing in Table 1 are physiologically possible, and not all of those that are physiologically possible occur in English, although they may occur in other languages. Acoustically the consonants exhibit a heterogeneous variety of features not all of which are phonemic, i.e., carry meaning in the language. If we cannot identify the phonemic characteristics of consonants by eye on the spectrograph, we can do better by reversing the process of translation.

Painted Speech

Just as sounds may be translated into a geometric pattern by the spectrograph, so arbitrary geometric patterns may be translated into sounds by the "pattern playback" (Cooper, Liberman & Borst, 1951; Delattre, et al., 1956). Fig. 4 shows how the pattern playback works. The pattern played back may be a real spectrograph or, what is more important,

Table 1. Classification of English Consonants

Position of articulation	Type of articulation Plosives	Nasals	Fricatives	Laterals	Trills
Bilabial	p (pie) b (by)	m (me)	w (we)		
Labiodental			f (fine) v (vine)		
Dental			θ (thin) ð (then)		
Alveolar	t (to) d (do)	n (no)	s (sip) z (zip) r (rip)	l (lip)	
Cac[illegible]al					
Palatal			ʃ (she) ʒ (azure) j (yes)		(None)
Velar	k (key) g (go)	ŋ (sing)			
Glottal	?	(None)	h (he)	(None)	(None)

(Miller, 1951)

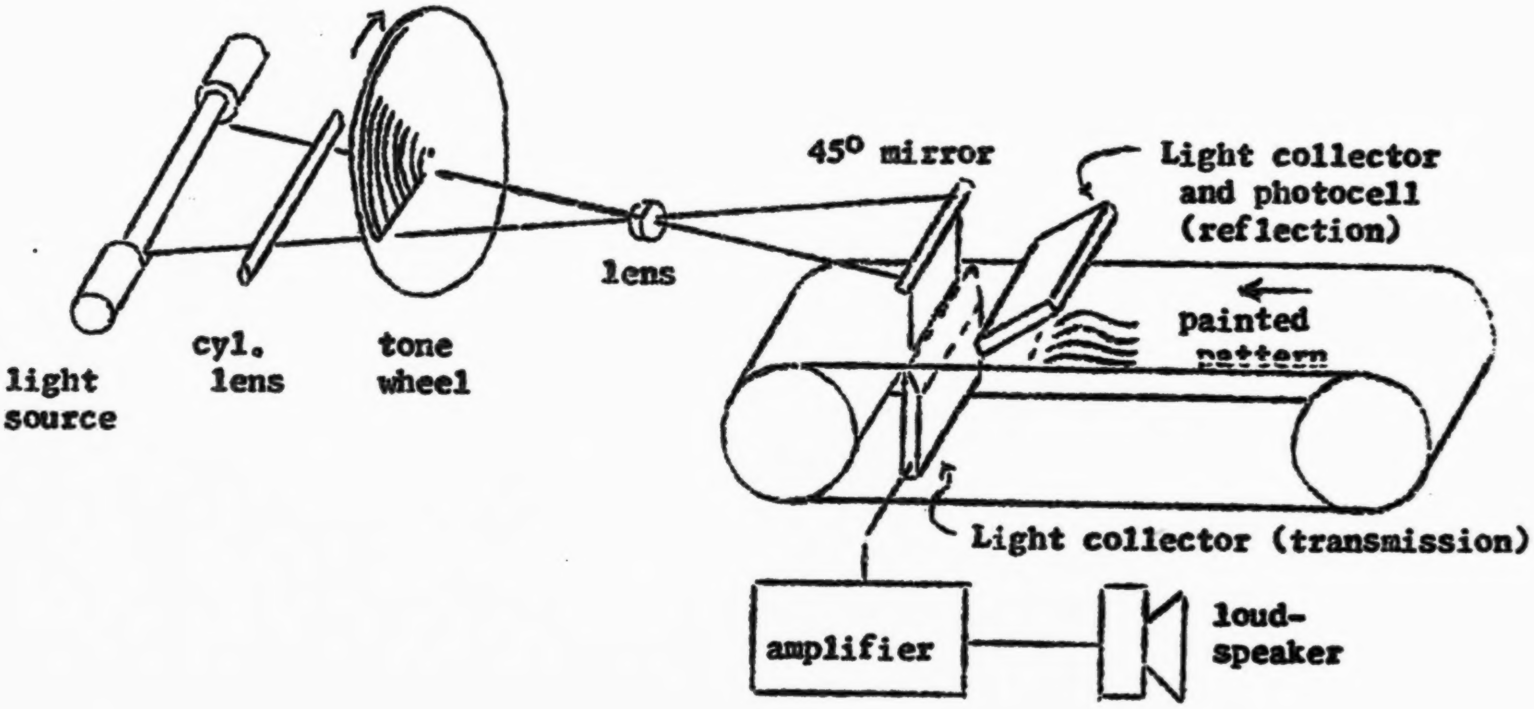

45° mirror
Light collector and photocell (reflection)
lens
painted pattern
light source
cyl. lens
tone wheel
Light collector (transmission)
amplifier
loud-speaker

Fig. 4. Pattern Playback. The tone wheel produces an image of a slit of light that flickers slowly at one end and rapidly at the other. The painted pattern selects the combination of frequencies that is transmitted to the loudspeaker. (Cooper, Liberman, & Borst, 1951)

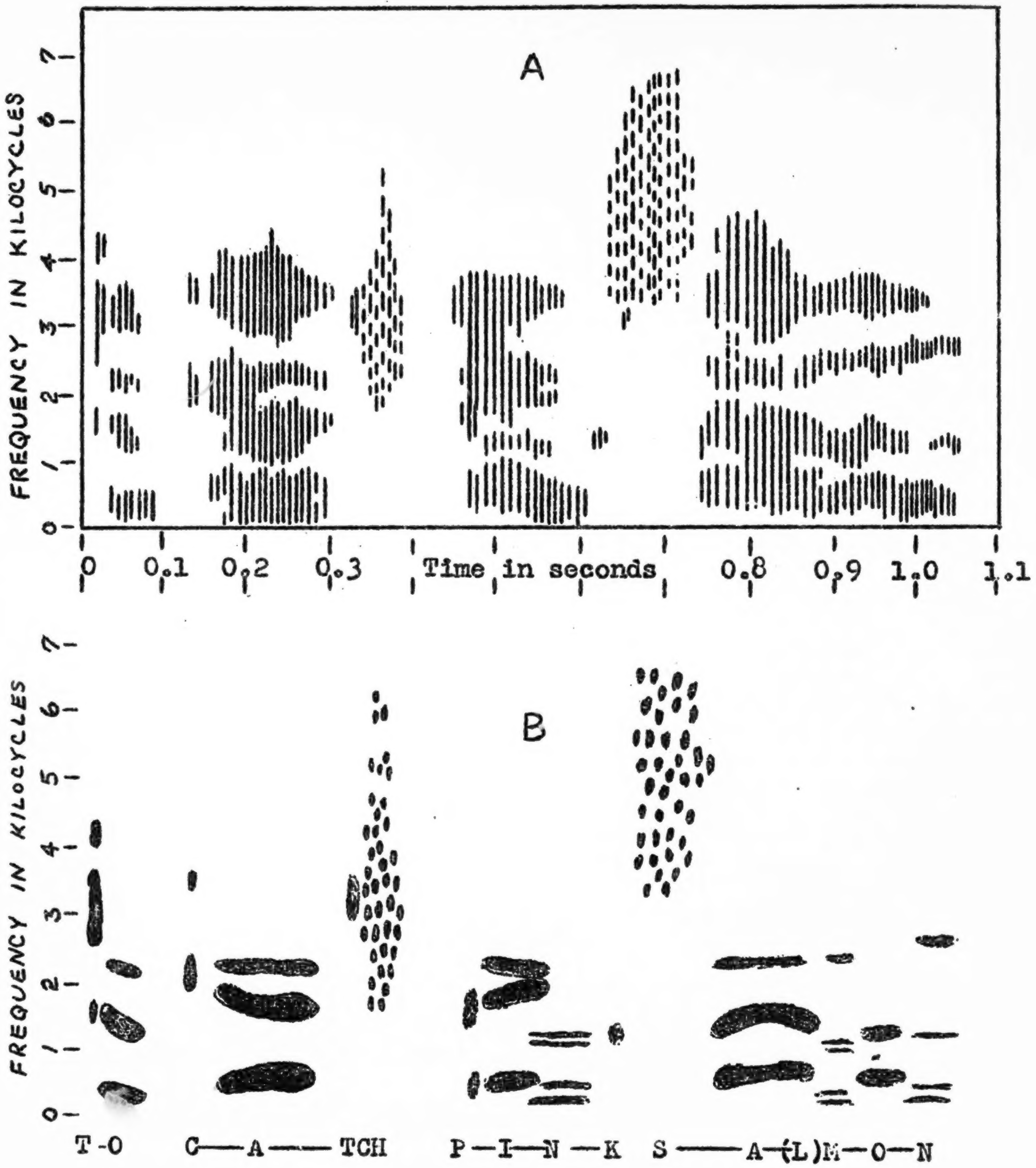


Fig. 5. (A) Sound spectrogram of human speech. (B) Simplified version of the same phrase, painted by hand. Both of these spectrographic patterns are intelligible after conversion into sound by means of the pattern playback. (Cooper, et al., 1952).

a hand-painted pattern incorporating the experimenter's hypotheses about which aspects of the speech sound are phonemic. Fig. 5 represents a spectrograph and a hand-painted synthesis of the same phrase.

This instrument places a powerful analytic technique in the hands of the student of speech. He can make speech and speech-like sounds to order, play them over as often as he wishes, obtain judgments of what the playback "said" from as many listeners as he desires, vary any aspect of the sound that he suspects is phonemically critical, and ask his listeners to compare the resulting utterances. The object of this kind of investigation is not to describe speech as it occurs naturally, but to specify the acoustic features of any utterance that are essential to convey meaning in that language. If these minimal features are deleted or modified the listener no longer identifies the sound as the same utterance (Liberman, et al., 1959).

The variety of acoustic cues that are known to determine the identification of utterances is too great for full description here. A sample must suffice in this brief sketch of a rapidly growing subject. For instance, one of the things that distinguishes among the stop consonants /b/, /d/ and /g/ when they occur before any vowel is the initial transition of the frequency of the second formant of the vowel (Fig. 6). The second formant of a vowel following /b/ starts with an upward glide, as though from a very low frequency, before it levels off at whatever frequency is characteristic of that vowel. These transitions do not actually begin at a constant frequency, but form a drooping "tail" that points to a more or less fixed low frequency. Following /d/ the second formant originates at (the tail points to) about 1800 cycles per second and rises or falls toward the steady frequency that is characteristic of the following vowel. The transitions of the second formant of vowels after /g/ fall into two groups. Before front vowels the transition falls from a high frequency. Between /ga/ and /gɔ/ this pattern breaks abruptly. The second formant of the back vowels also begins with a falling transition, but it originates at a much lower frequency. These inferences are based, not upon how human speakers pronounce /b/, /d/ or /g/, but upon how human listeners identify auditory reproductions of patterns like those in Fig. 6.

An example of another important class of phonemic cues is one of the differences between /d/ and /t/. The onset of the first formant of /o/ following /t/ is delayed longer than following /d/. If the onset of the first formant in the painted patterns of Fig. 7 is delayed less than 10 milliseconds the listener reports /do/ (as in doe); if this delay is more than 40 milliseconds (but not too much more) the listener reports /to/ (as in toe). Although there are also

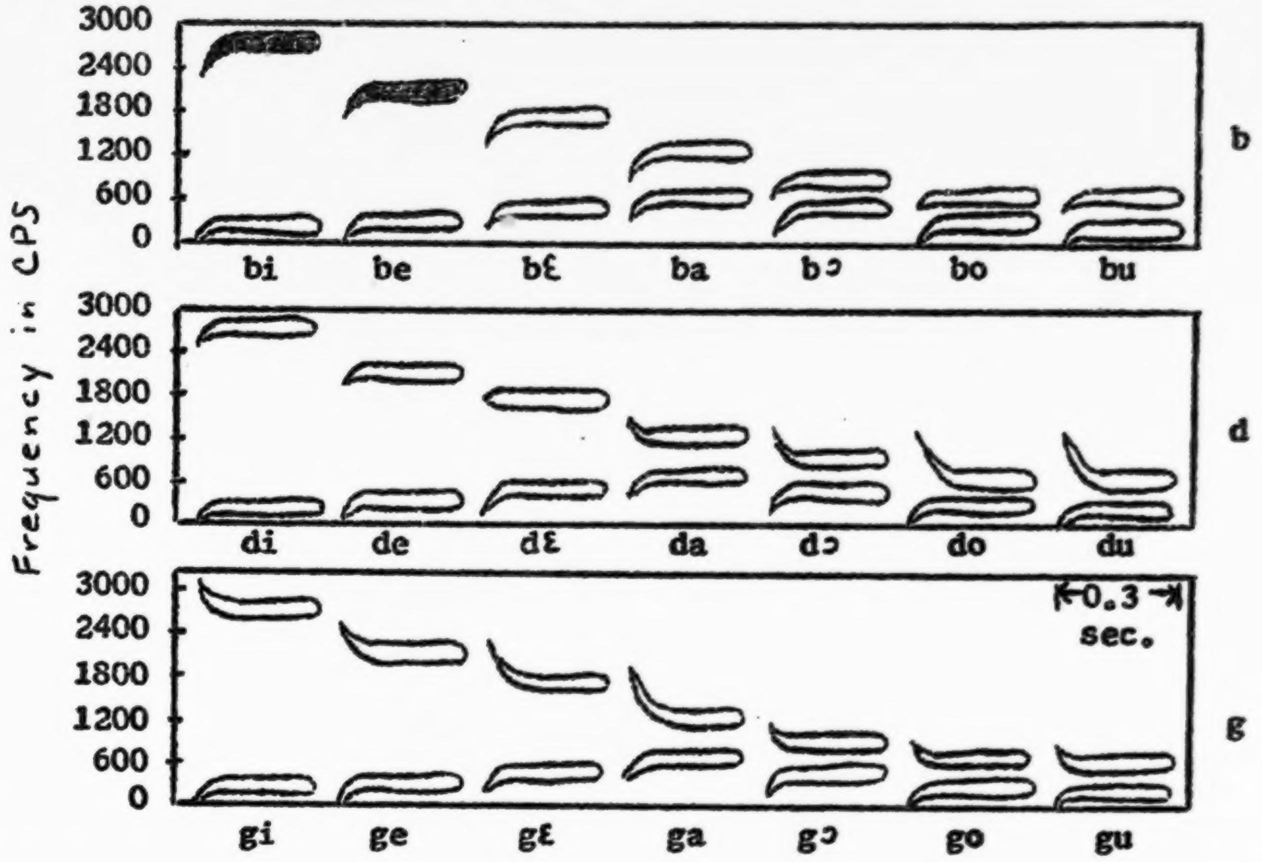

Frequency in CPS
3000
2400
1800
1200
600
0
bi
be
bɛ
ba
bɔ
bo
bu
b
di
de
dɛ
da
dɔ
do
du
d
gi
ge
gɛ
ga
gɔ
go
gu
g
←0.3→
sec.

Fig. 6. Painted patterns showing the transitions of the second formants of different vowels following /b/, /d/ and /g/ (DeLattre, Liberman, & Cooper, 1955).

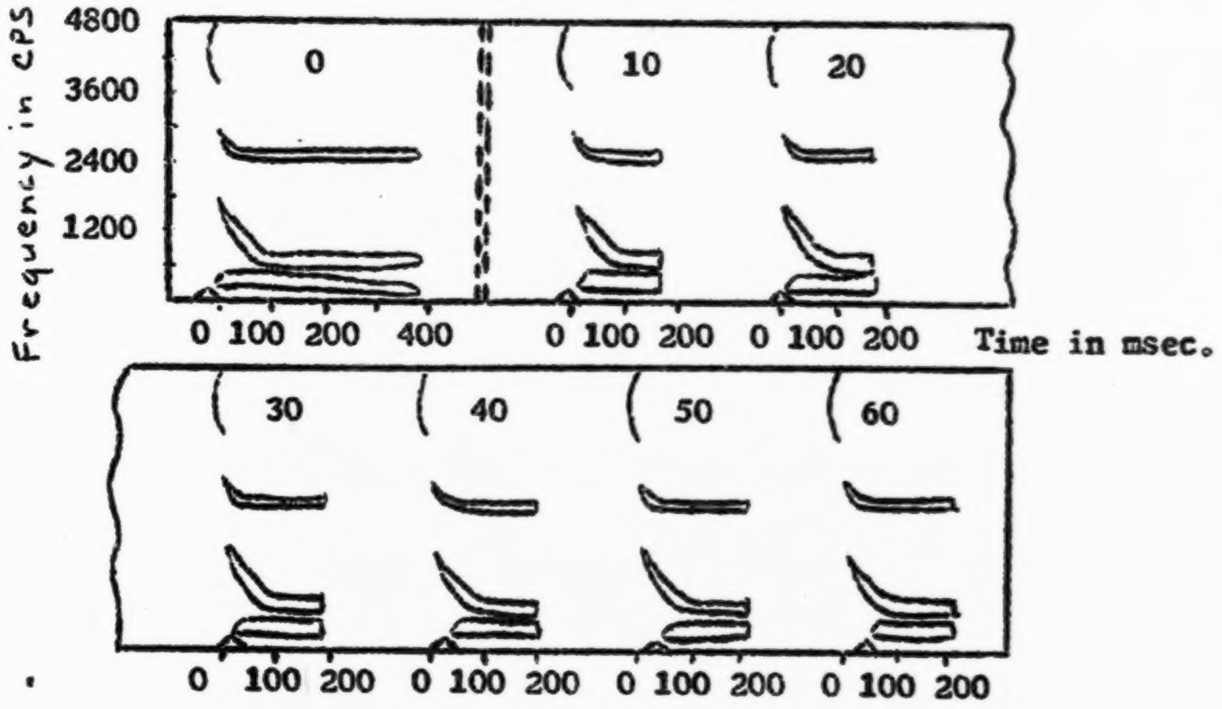

Frequency in CPS
4800
3600
2400
1200
0
10
20
0 100 200 400
0 100 200
0 100 200
Time in msec.
30
40
50
60
0 100 200
0 100 200
0 100 200
0 100 200

Fig. 7. Illustrations of the patterns used to study the effects of the first-formant time of onset on the perceived distinction between /d/ and /t/. The numbers above the patterns show the extent of cutback in msec. (Liberman, DeLattre, & Cooper, 1958).

other differences between /d/ and /t/, the time of onset of the first formant is sufficient to distinguish them completely when they occur just before /o/.

The quest for a complete set of minimal rules for synthesizing speech is the obverse of the concurrent quest for a "speech-writer," i.e., a device for automatically transcribing speech into writing (Kelly & Gerstman, 1961; Stevens, 1960). Programs are being written, with some success, to enable computers to take dictation. Ideally these programs would contain the obverse of the synthetic rules, the minimal rules for recognizing speech. Neither set of rules has yet been rendered in a general and minimal form, but reasonably general and reasonably efficient ways of transforming speech into writing (intelligible notation) and writing into speech (intelligible utterances) may be attained without satisfying the stringent requirements of an ideal acoustic theory of speech.

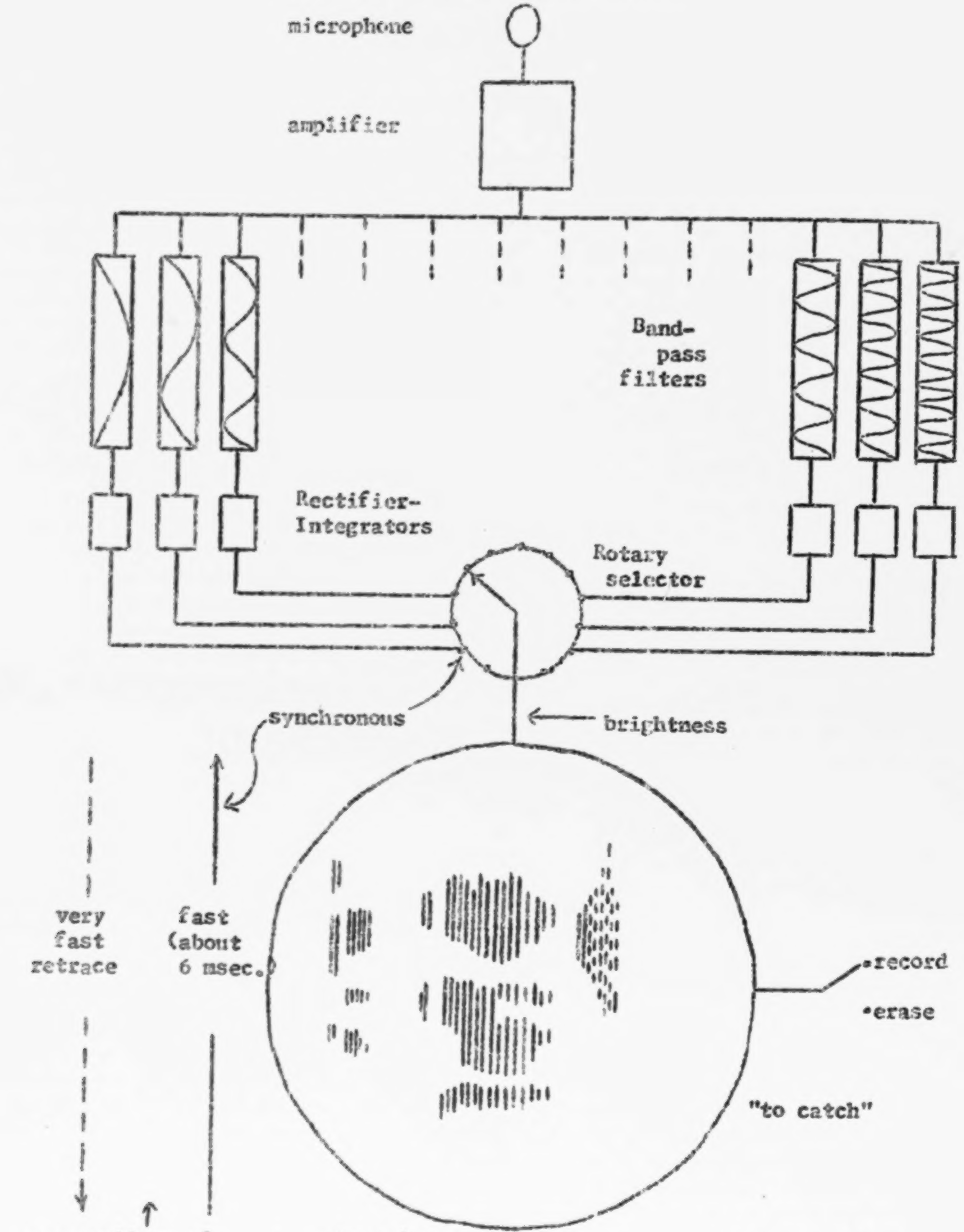
Teaching Devices

The advent of the tape recorder made the modern language laboratory possible. Records of model speakers had long been available, but listening was not enough. The tape recorder made it feasible to have the student listen to a model speaker, record his own response, listen to the correct response, and compare, and correct himself as necessary. The organization, cost and technical specifications of a language laboratory have been described elsewhere (Johnstone).

One of the simplest auditory aids is to let the student hear himself. During oral drills in groups he may be unable to hear himself over the interference of other students saying the same thing at the same time. Sound-powered earphones, which do not require electrical connections, might overcome this obstacle in classrooms not provided with the equipment of a language laboratory.

Visible speech is a research tool at the present time. Most spectrographs are not made during the original utterance, but from a recording, and employ a scanning technique that requires more time than the original utterance (Peterson, 1954). It is possible, however, to make satisfactory spectrographs of utterances as they actually occur. One group of investigators developed a method for displaying "real-time" spectrographs on a rotating cathode ray oscilloscope and found that they could carry on a conversation by each reading a spectrograph of what the other said. This device has also been used to teach the deaf to speak (Potter, Kopp, & Green, 1947). The essential components of a real-time spectrograph, saying "to catch," are sketched in Fig. 6. This paper-and-pencil spectrograph (it has not been built) takes advantage of an oscilloscope that stores a picture until it is instructed to erase.

Fig. 8. Memoscope spectrograph.


microphone
amplifier
Band-pass filters
Rectifier-Integrators
Rotary selector
synchronous
brightness
very fast retrace
fast (about 6 msec.)
•record
•erase
"to catch"
motions of electron beam
about ½ sec.
(up to about 10 secs.)
very fast retrace

We do not know what visible speech can contribute to a language laboratory. It is new and more expensive than the kinds of equipment now in general use. The student with a "tin ear," or actual deafness, who does not perceive differences among speech patterns auditorily, might be able to learn visually, if he were provided with a painted-pattern and a television screen on which he could record the patterns of his own speech. The "normal" student might also benefit from the opportunity to compare his speech with visual as well as auditory models. The design of suitable spectrographs, of model patterns and of sound procedures for using them have not been worked out in detail. The cost, the difficulties and the probable rewards of using visible speech in the language laboratory are experimental problems which the state of the art is ripe to exploit.

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LEARNING THEORY, LANGUAGE DEVELOPMENT AND LANGUAGE LEARNING

Outline

I. Focus and broad conclusions

II. Framework for discussion

  A. What is learned during language learning?

  B. What factors influence the learning and its manifestations in performance?

III. The problem of the criteria of learning

IV. The framework revisited: What is learned during language learning?

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    1. Acquisition of responses

    2. Development of meaning

  B. Development of sets

    1. The nature of set

    2. Language sets

    3. Sets and verbal behavior

V. The framework: What factors influence the learning and its manifestations in performance?

  A. Repetition

  B. Generalization

    1. Physical stimulus generalization

    2. Mediated stimulus generalization

  C. Interference

  D. Reinforcement and motivation

LEARNING THEORY, LANGUAGE DEVELOPMENT AND LANGUAGE LEARNING

This discussion will pivot around the nature of language learning and those critical concepts in learning theory that bear upon such learning.

A review and evaluation of relevant literature, along with some rather subjective judgments respecting the broad task of learning a language, lead to the following conclusions:

1. Language learning proceeds in two stages. One stage concerns the development of vocabulary. The other, more time-consuming stage, involves the incorporation of the cultural aspects of the linguistic community into language use. One can see these stages in both first and second language learning. It might also be noted that the great amount of repetition required in first language learning provides the principal opportunity for the achievement of the second stage.

2. Learning a second language the same way one learns a first language would, on the one hand, be desirable, but on the other, it is both unnecessary and impractical. It is desirable because massive language "bathing" would facilitate the incorporation of cultural aspects into linguistic behavior. On the other hand, first language learning takes place at the same time that the individual is developing concepts. This double development makes that learning more difficult. By the time that second language learning begins, the individual has concepts available. The hooking up of new responses or associations with these concepts is easier, for they are meaningful. Thus, the amount of repetition required is less than for first language learning.

3. Because the development of the first language is tied in with the development of concepts in general, first language learning becomes a basis for defining concepts. Further, first language learning requires the development of speech behavior. Since these carry over to second language learning, I would hypothesize that many of the characteristics of language learning and performance are similar in the two cases. Such factors as verbal fluency, sensitivity to language habits, level of discrimination of meanings--these factors are, I suspect, powerful predictors of success in a second language. In short, I am at this point proposing a research approach in which we would study, among good and poor second language learners, characteristics of their first language learning.

4. Verbal behavior, which is one of several ways to reveal language learning, is affected by a number of variables which may impair performance. Considerably more attention needs to be given to this aspect of language learning. We have data to demonstrate that variations in verbal activity are highly predictable consequences of perceived stress, anxiety and threat of failure. These data need verification in language behavior situations.

5. We are painfully lacking in knowledge of, and techniques for, the effective manipulation of reinforcement in second language learning.

Looking for a model to follow in organizing my discussion, it occurred to me that a framework might evolve if we ask two questions:

1. What is learned during language learning?

2. What factors influence language learning and its manifestations in performance?

The remainder of the discussion is directed to these questions. Before we turn to them, however, I would like to consider the problem of the criteria of learning. What level of proficiency is wanted in second language learning? I have certainly detected some ambiguity on this score in the seminar proceedings to date. And yet the question is fundamental to any training program, to the expectations of teachers and, I dare say, to the frustration tolerance of students. Do we want true bilinguals, efficient translators, language requirement satisfiers, or what? Research could be wisely and profitably initiated to develop graded criteria of language learning.

Let us turn now to our first question: What is learned during language learning? Perhaps another way to put this is to ask, what does the individual do during language learning, and what changes does he undergo? I think that two broad categories of changes are observable.

A. The individual forms associations.

B. The individual develops sets.

With respect to the formation of associations, two operationally distinct processes are involved.

1. Acquisition of responses.

Responses are acquired through paired association and serial association learning. The individual learns that A is followed by B, that GUK is followed by PUH. The formation of any association implies the development of meaning. This level of learning is critical, for it allows for differentiation among items. Although you do not know what "B" or "PUH" is, you know they are different for they are associated with different stimuli (Noble, 1952).

There are a number of useful generalizations in the psychological literature that have relevance for this kind of learning:

a. Meaningfulness facilitates the learning of stimulus-response pairs (Hunt, 1959; Harleston & Cunningham, 1961).

b. In a paired-associate learning task, the facilitative effects of meaningfulness are greater the more meaningful the response members (Hunt, 1959; Harleston & Cunningham, 1961).

c. There is backward learning. During the forward acquisition of "A then B," the association, "B then A," is also being formed (Murdock, 1956, 1958; Feldman & Underwood, 1957).

d. Object-word learning is faster and produces fewer errors than word-word learning (Wimer & Lambert, 1959).

e. Serial learning is most difficult in the middle of the list. This may be an artifact of this learning procedure. Also it may produce artificial learning. On the other hand it is useful in providing an opportunity for differentiation.

2. Development of meaning.

We are indebted to Osgood for a very provocative model for the development of meaning proper. The major mechanism in this model is a somewhat vaguely defined process of mediation through association. It is a model which suggests that meaning is an implicit response. Thus Osgood states (1954, p. 127):

> "....Total stimulation from the object ($\mathring{S}$) elicits a complex set of reactions (R_T); in the case of the baby's bottle, these reactions would include sucking, salivating, swallowing, and so forth. The distal stimuli ($\boxed{S}$) which regularly antedate or accompany total stimulation from the object will tend to evoke some reduced portion of this total behavior as a representational mediation process (r_m); in the present instance, sight of the bottle may produce anticipatory salivating and lip-pursing movements. The self-stimulation (s_m) arising from the mediating reaction is the conscious awareness of meaning and may become associated with various instrumental sequences (R_x), such as reaching forward with the hands, vocalizing, and so forth (e.g., encoding mechanisms).
>
> "Distal cues (perceptual signs) bear a necessary and inevitable physical relation to the objects they represent--not the arbitrary, assigned significance characteristic of most linguistic signs. Since the distal cues of common objects appear in a variety of contexts--at various angles of regard, under various illuminations, at varying distances, and so on--but antedating the same behavioral object, these modes of appearance become a class of signs having the same significance. This is the phenomenon of perceptual constancy, and it is only one instance of the intimate relation between perceptual and meaningful processes."

$$\begin{tikzcd}
 & \mathring{S} \arrow[rr] & & R_T \arrow[dll, dashed] \\
\boxed{S} \arrow[r] & r_m \arrow[r, dashed] & s_m \arrow[r] & R_x
\end{tikzcd}$$

Osgood's model for the development of meaning has inspired a number of experimental studies whose results have increased the usefulness of the model.

Staats and Staats, in a series of studies (Staats, Staats, & Heard, 1959; Staats, Staats, & Nims, 1959), have demonstrated that the evaluative meaning of a word can be changed by pairing it either with words of positive or words of negative evaluative meaning. Further, they have demonstrated that synonyms of the words conditioned also change in evaluative meaning. (This latter phenomenon is an instance of mediated generalization, of which we will have more to say later.)

Extending the mediation model to second language learning, Osgood proposes that, in fact, two different language systems can emerge.

1. Compound language system: Here two sets of linguistic signs come to be associated with the same set of representational mediation processes (meanings) and the same set of representational mediation processes come to be alternatively associated with two sets of linguistic responses.

Sign	Representation	Response
house	house	house
maison	house	maison

2. Coordinate language system: true bilingualism.

house	house	house
maison	maison	maison

In the typical classroom situation of second language learning, everyone goes through the compound system, though in varying degrees. With increased proficiency (some argue that this is realized only by direct acculturation) one moves to the coordinate language system.

Besides the formation of associations, language learning requires the development of sets. The concept of set has had a stormy and controversial history in psychology, chiefly pivoting around the explanation of the phenomenon.

Hilgard (1957) defines set as a preparatory adjustment or readiness for a particular kind of action or experience. Hence, sets are learned. The evidence for their development is pervasive and convincing. Sets have been demonstrated to operate in problem-solving situations, motor performance situations, and, of course, situations involving language and verbal manipulation.

Sets may be facilitative or interfering. With reference to language learning, the ones I have in mind are facilitative, although they may produce classical errors.

Following Osgood's choice of terms, the sets developed can be called:

1. ordering sets (noun followed by verb)

2. extension sets (cat-cats, dog-dogs)

3. congruence sets (singular-singular, plural-plural)

You may want to protest that these are quite ad hoc formulations, and the protest would be valid. And yet, the fact that the child can and does apply such sets to new words, including artificial words, and that he makes errors when confronted with syntactic irregularity offers some measure of independent validation. Further, there are data from the study of both English and French which reflect the operation of such sets and their development as language proficiency increases.

For example, Lambert (1956a, 1956b, 1956c), in an extensive investigation of the language behavior of undergraduate and graduate students studying French, and native French speakers, found that as sophistication in the language increased, the frequency of appearance of the habitual word order of that language increased: He found that the number of adjective responses to noun stimuli increased with increased experience with French.

The question of the nature of associations to verbal stimuli in English has been the basis of a number of investigations. The principal results of these studies permit the following generalizations (Andreas, 1960):

1. Some words have extremely high transitional probabilities, i.e., for many words, virtually everyone will give the same association.

2. Speed of association is directly correlated with frequency.

3. The most frequent types of associations are coordinates (table-chair) and opposites (black-white).

4. Context influences associations. Perhaps from the point of view of language learning this is the most significant generalization. In one study, Howes and Osgood (Osgood, 1954, p. 117) investigated the effect of context on associations to words. The subjects were presented with four words in sequence, and asked to respond to the fourth word with the first word that came to mind. With this design the experimenters could study the effect of context on association and the extent to which the separation of words would affect context and associations. They found that the associations given did depend upon context, and that the capacity of a word as context to influence the response decreased as its distance from the response increased.

Another approach to this question of context was pursued by MacCorquodale, et al. (Osgood, 1954, pp. 117-118). Subjects were presented one of two sentences, and asked to fill in the missing word.

a. The children noticed that the snow was beginning to hide the ground as they got out of ___________.

b. The children noticed that the snow was beginning to blanket the ground as they got out of ___________.

The response, school, was given more often when the first sentence was read, and the response, bed, was given more often when the second sentence was read.

These studies point to the development of sets, of dispositions to perceive and react. Of course, a set may produce incorrect responses, e.g., "go," "goed." The irregularities in languages are not facilitated by such sets, for they do not fit any one form. How, then, does the individual learn to handle such irregularities? He does so by increased repetition of them as irregularities. And he gets this repetition every time he makes a mistake, for we correct errors produced by an incorrect set. On the basis of this analysis, incidentally, one would predict that those instances of irregularities involving words with high frequency of usage, would be learned as irregulars more quickly and show less effect of set. A cute experiment could be designed to check on this. Teach subjects nonsense words for various irregular verbs, then have him create other tenses of the words. We would predict greater inter-subject agreement for those nonsense words associated with high frequency than for those associated with low frequency irregular words.

Our second broad question was, What factors influence language learning and performance? What do these variables mean and how can they be manipulated?

My answer embraces some four or five concepts. These are:

1. Repetition
2. Generalization
3. Interference
4. Reinforcement and motivation

A. Repetition or practice is a key concept in any learning theory. While for many theorists its role is seen as that of strengthening associations, some theorists, notably Estes (1960), argue that the role of practice is to provide repeated opportunities for the formation of an association between a stimulus pattern and the response.

This latter view is of particular significance in emphasizing that the stimulus is, in a sense, always changing. Or, to put it another way, the stimulus at any given time is a sample of a larger pattern. What is useful in this emphasis is the possibility of subtle variation in the stimulus, for there is subtle variation in language stimuli. There are nuances in meanings that make one word slightly different from another and more appropriate in a particular context. In short then, what I derive from this emphasis is that indeed there should be repetition in language learning, but there should be repetition in a variety of contexts, so that the full meaning of the stimulus is obtained.

B. Generalization.

Training on a particular stimulus increases the probability of similar responses being made to similar stimuli. This phenomenon is known as generalization. Broadly speaking, we can identify two kinds of generalization.

1. Physical stimulus generalization. Here generalization results from similarity based upon structure, spatial arrangement, intensity variations, etc. In language learning examples of opportunities for generalization of this sort are found in the following:

papier	(paper)
table	(table)
enfant	(infant; this is a good example of a poor or incorrect generalization)

2. The other kind of generalization is mediated stimulus generalization. Here generalization results from similarity of meanings. We referred earlier to the Staats, Staats, & Heard (1959) study showing generalization of this sort. Two other studies of interest in this context are worth reporting. In one of these, Mednick & Freedman (1960) had subjects learn a paired-associates list of nouns and adjectives. The list was so constructed that 4 of the 12 stimuli used were paired with responses which had relevance to a common concept, e.g., soft, white. After learning the paired associates, the subjects were required to go through the 12 stimulus words and group them into three concept categories, giving adjectives appropriate for describing them. They found that the words which had responses bearing upon a single concept were, indeed, grouped together, and the appropriate concept for this grouping was learned more quickly than the two other concepts. It is inferred that the more rapid acquisition results from mediated generalization; all four responses suggested the same meaning, and the stimuli associated with these responses were thus linked to this common meaning.

A somewhat different approach was used by Buss (1961), who investigated mediated stimulus generalization. The degree to which a list of 146 words had an aggressive connotation was determined. Four groups of subjects were then conditioned to respond in a particular way to 20 of the most aggressive, and 4 groups were conditioned to respond to 20 of the least aggressive words. All subjects were then tested to determine the extent to which they would respond to the remaining 126 words covering the entire aggression scale in the same manner in which they responded to the training words. Buss found generalization from intense to mild and from mild to intense, i.e., the extent to which subjects responded in like manner decreased as the differences in intensity between test and training words increased.

There is, then, as a part of language learning, generalization. This is true for both first and second language learning. While generalization may facilitate, it may also interfere. It seems to me that a critical part of language teaching would be careful programming so as to maximize facilitative transfer.

C. Interference.

This principle is a basic one in the psychology of learning. It has been invoked to conceptualize both task difficulty and forgetting. Basically, interference refers to response competition. If a response has been associated with a given stimulus, interference is present when one attempts to associate another response with that stimulus. The amount of interference increases as similarity between the two responses decreases (Besch & Reynolds, 1958).

In translating from English to, say, French, the English sign elicits a meaning which in turn elicits both the English and the French responses. Since the English is dominant, it competes, making translation difficult.

One might wonder how we ever learn, then, to use another language. One answer, of course, is that by repetition we strengthen both responses so the stimulus comes to elicit both. Another answer is what may be called the atmosphere or cueing effect; this is analogous to the stimulus and its varied meanings. We rely upon environmental cues in language behavior, and these cues provide an atmosphere effect, which is a part of the stimulus. In an atmosphere of translating in French, other phrases involving the response come to mind. We can then take the response out of such a phrase for use in the present situation. This view argues, incidentally, for learning the language in the cultural milieu. (The fact that this may not be practical is irrelevant here.)

Interference, then, is virtually inevitable in second language learning because of the first language, and to program teaching so that interference is minimized is a real challenge.

D. Reinforcement and motivation.

Much is made of the powerful role of reinforcement in learning. The presence of reinforcement--which stresses the importance of the consequences of actions in determining whether actions are repeated--is assumed to be a necessary condition for continuing to react; some theorists believe reinforcement is essential for the acquisition of responses. The opportunities for and instances of reinforcement during first language learning are many (Brown & Dulaney, 1958).

1. Engaging in language behavior helps one to realize his needs--you get what you want by communicating. (It is assumed that the absence of this demand for the later children in a family accounts for their learning to speak more slowly than first children.)

2. Parental approval

3. Control over environment

4. Opportunity to explore and satisfy curiosity

The operation of these factors is less probable in second language learning. This is because another language is available, *and* because the learning of the second language may not be perceived as *producing these effects*.

These facts raise, then, a very interesting question. What conditions of reinforcement can be effectively manipulated to produce and maintain second language learning? It is suggested that the following possibilities are worth exploring.

1. Manipulate the exploration value of the second language. This can be done better with children, hence it is a support for FLES programs.

2. Condition attitudes. This may be tantamount to changing the "meaning" of language learning; its purpose would be to make the learning of a language a positive activity.

3. Strengthen and make more positive first language learning. This suggestion underscores the hypothesis that level of interest and performance in one's first language are major determinants of second language interest and performance.

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ONTOGENETIC DEVELOPMENT OF LANGUAGE

Language is a uniquely human capacity. Although bees can indicate by a dance the direction and distance of a field of flowers (Von Frisch, 1950), and most animals can communicate emotions, only man uses verbal symbols of objects and relations. Because linguists have emphasized the communicative function of language so exclusively, we tend to forget that, like other animals, we also use it to express feeling tone ("Ouch!" "My God!"). Furthermore, we use it for solving abstract problems that could never be handled in any except a symbolic way (e.g., mathematical problems), as well as concrete problems, for which language is a short-cut. That the whole organism, its emotional as well as its cognitive sides, is involved in the language process is clear from observations on both animal and human subjects. Mowrer (1950) found that parrots and mynah birds learn to talk only when a great deal of time and attention on the part of the teacher is devoted to the training process, and clinicians have repeatedly reported on the detrimental effects of lack of affection on the language development of children. Church (1961, pp. 5, 60-61) argues that the child's first approach to language is physiognomic and that in a global sort of way he learns to understand a person, not the words said.

As in all psychological processes, both biological endowment and environmental stimulation are involved in language development. First a basic neuromuscular capacity must be present and at an appropriate level of development; before approximately one year, no child has the biological structures required for speech. And unless the child has a minimal intellectual endowment, he never talks.

Secondly, speech is first an aural-oral process, and a deaf or hard-of-hearing child learns to talk only as a result of artificial teaching techniques. It is probable that the kinesthetic experience coming from his own speech activities is also important, but this is harder to demonstrate.

But given the biological endowment, the language process does not develop without stimulation from the environment. All babies vocalize spontaneously at an early age, but their repertoire of sounds is at first small, gradually becoming larger and more clearly differentiated (Lynip, 1951). Church (1961, p. 80) thinks that the order in which vocal sounds mature and appear in the baby's vocalizations is the same regardless of linguistic or racial background. But to turn these sounds into language requires both an example and (probably) a warm emotional tie to the adult users of the language being learned.

The Original Word Game (Brown, 1956, pp. 284-295) involves a person who knows the particular patterns of verbal symbols called English (French, German, etc.), and a naive subject.

The tutor repeats sounds in the pattern appropriate to the language being used in the context of various behaviors and objects, so that (1) the subject gradually learns that certain verbal patterns appear in association with certain objects, acts, and relations (categories), (2) he is rewarded for the (approximately) correct reproduction of these patterns (some of the reward may be merely the satisfaction that comes from mastery of the pattern), and (3) the subject is stimulated to get an enormous amount of practice, so that his production of the sounds matches more and more closely that of the teacher.

Language learning involves two sides: passive (receptive, recognitive) and active (productive, use). The former comes first temporally, and the term refers to the understanding of words spoken (later, read), although the subject cannot himself produce the words. It is likely that at the start the child has no conception of the relation between the spoken sound and the object or behavior. Meumann (1902) reports that his son who had learned to point to the window on being asked, "Wo ist das Fenster?" did equally well when asked "Où est la fenêtre?" or "Where is the window?" And he still pointed to the window when asked "Wo ist die Tür?" Once the idea of a relation between sound patterns and things, between verbalizations and the possibility of controlling the environment by the verbal technique, has soaked in, the Word Game progresses rapidly. Evidence indicates (Kellogg & Kellogg, 1933, pp.295-296) that despite reward and punishment for correct and incorrect choices, after 100 trials a 17 month-old child had not learned to fetch the correct object of three similar objects when he heard the name alone and ~~could~~ not see the speaker. Yet this child could already obey correctly some 50 spoken requests. This suggests that the association of sounds and objects is dependent in the early stages upon subsidiary cues and probably most particularly upon the child's own actions in respect to the object. This is a problem which calls for research.

Over a period of time the child builds up a repertoire of phonemes, gradually emphasizing those of his mother tongue; it is probable that he cannot imitate a word until he has spontaneously produced all the phonemes of which it is composed (Lewis, 1936, p. 170 ff.). Young children often produce sounds not used in the mother tongue and conversely they may be unable to produce some particularly difficult sound until the age of five or six years. Chen and Irwin (1946) and Irwin's (1947) work show that at the age of six months the American baby can produce on the average 12.3 phonemes (7.1 of the vowel-type, 5.2 of the consonant-type) compared to the 9 vowels, 8 vowel diphthongs, and 23 consonants of adult American speech (Bloomfield, 1933, p. 91); at 30 months the mean number of phonemes is 27.2. Like adults they do not correctly identify the sounds they make themselves although they may discriminate the sounds made by others. (E.g., A child calls "fish," "fis," but becomes indignant if the parent says "fis.")

It must be recognized that a young child gets an enormous amount of active practice (as many as 15,000 words may be used by a 3 year-old in one day; McCarthy, 1954, p. 542 f.) plus all the passive practice he gets from hearing adults talk to each other as well as to him.

When one tries to describe the characteristics of child language and the way it changes with time, one faces many difficulties. For example, in trying to trace the growth of vocabulary, how do we decide what to call a "word"? If a child knows both "sit" and "sat" does he know one word or two? The result of such difficulties of definition is that there is great disagreement in the figures reported by different investigators, but in general they agree that the size of a child's vocabulary increases as a function of time in an S-shaped manner, very small increments being added at the start, then increments of increasing size, which appear to reach their maximum between 24 and 36 months, and finally a gradual slowing down, as the great majority of useful words for everyday communication is learned (Smith, 1926). It is probable that the growth of vocabulary continues during the individual's whole life time, though at a constantly decelerating rate.

One characteristic of early language is agreed upon; the very first words used meaningfully are holophrases. By context and intonation, gestures and facial expression, the 12 to 18 month-old makes "milk" mean "I am hungry," "I upset the milk glass," "Give me more milk," etc. Only slowly does he construct patterns of words in which the word element is a removable and modifiable part of the total. Early phrases, commonly used, are experienced as totals: "all gone" becomes "awgone" and is understood as one unit.

When the child grasps the basic idea of language--that all objects have names, that verbal patterns can refer to absent objects, and hence that a verbal production may control the behavior of the environment--the child's vocabulary increases rapidly. This is the period of constant "What's dat?" questions, and continual verbalization both to other people and as an accompaniment to solitary play. Such early language is, of course, concrete and closely tied to the real world of things and action. The young child is a pragmatist, and his early definitions are in terms of use: a chair is to sit on. Slowly, however, the structure of the language and its abstract nature are appreciated, and his definitions become explanations or the giving of synonyms (Feifel & Lorge, 1950).

Several factors besides chronological age influence the rate of development and the gradual achievement of the adult characteristics of speech. Intelligence has already been mentioned; typically the bright child talks earlier and better than the average, and the dull or feeble-minded child always has a small vocabulary and uses words in a simple and immature manner.

Early studies indicated that girls spoke earlier, more, and more correctly than boys, but the more adequately controlled recent evidence suggests that the differences are slight, to a large extent dependent on the kind of material used (which determines interest) and probably chiefly reflect the girls' slight general acceleration in development (McCarthy, 1954, pp. 577-581; Templin, 1957).

First children tend to talk sooner and better than later children in a family, perhaps because of the greater adult attention and the more mature patterns presented, but this advantage disappears with age. Twins or triplets speak later than the average, probably because of the ease of nonverbal communication between identical age-mates in the same environment (McCarthy, 1954, pp. 590-591).

As would be expected, the socioeconomic level of the child's family is an important variable. Not only do parents from higher socioeconomic levels depend more on language themselves, but they tend to place a higher valuation on fluent speech and besides setting an example, reward speech production more highly than parents of a lower socioeconomic level (McCarthy, 1954, pp. 586-587).

A final environmental factor that is of special concern to us is the effect of bilingualism. What is the influence on the size of vocabulary, the correctness of speech, etc., of hearing two languages from infancy? Unfortunately there are relatively few studies, and in many cases the effects of bilingualism are contaminated by other factors (e.g., socioeconomic level), but the evidence suggests (McCarthy, 1954, pp. 591-594) that (1) vocabulary in both languages is considerably reduced compared to the norm, (2) there is a tendency for bilingual children to score slightly below the norm on intelligence tests, especially of the verbal type, (3) bright children handle the problems posed by bilingualism more easily than average or dull children, (4) bilingualism is a handicap to the child's school adjustment and academic achievement, but (5) pronunciation is superior when a language is learned at an early age. As McCarthy (1954, p. 594) points out, in this day of rapid transportation, frequent international contacts in both business and government, and many families in a government service which takes them abroad for extended periods, we need much more and much more precise information about these problems.

One problem of great concern to anthropologists and linguists as well as psychologists is the relation between language and the outer world. Whorf (1956, pp. 233-245) holds that the linguistic pattern used by a people determines the way in which they perceive the world, and in a somewhat less dogmatic way Sapir (1921, pp. 3-23) agrees. Others hold that all people perceive the concrete aspects of the world in the same manner, and any language is simply a unique coding device for referring to and classifying these characteristics.

Several experimental studies of the question (Brown, 1956, pp. 291-295; Brown & Lenneberg, 1954; Carroll & Casagrande, 1958) indicate that the language spoken certainly tends to influence the manner in which people classify objects of the environment, but results are not entirely univocal. Usually when the unnoticed aspect of the stimulus is called to the attention of a speaker of another language, he also can make the required perceptual distinctions. In other words, people discriminate those aspects of the environment that are of practical importance to them, and frequency of contact and need to communicate make them develop specific words for referring to such environmental characteristics. However, it will usually be found that although another language may not offer specific terms for these details, phrases or circumlocutions can be found to refer to them in a meaningful way.

The development of language by children is such a universal phenomenon that the very real psychological complexities involved are often overlooked. Any normal child, regardless of his racial heredity, can learn to speak any language "without an accent" if put into the proper environment soon enough. With practice he not only repeats what he hears, but also reorganizes the elements of the language so as to say things that have never been said before, using the grammatical structure appropriate to the language being spoken. Certainly a theory of rote learning is quite inadequate to explain this development, but how it does come about is not well understood, and there are many challenging questions that call for study. The following come to mind:

1. What is the best way of reinforcing a child for his successive approximations to a correct production of phonemes? To the correct use of words? Are such reinforcements fundamentally different in first and in second language learning?

2. Is learning the mother tongue dependent on making muscular movements (other than those of the parts of the body involved in speaking)? Could second language learning be speeded up by incorporating more (non-vocal) motor behavior along with speech?

3. At what age can a vocal pattern be attached to an object without any context of an expressive type? Is this related to evidence that perception (visual) is dependent on motor activity?

4. Can an infant imitate vocal sounds which he has not produced spontaneously? Is this question relevant to second language learning?

5. Is there any way of testing the hypothesis that there is a "critical period" for learning the first language? Is there any age at which the learning of the second language is particularly easy? particularly hard?

6. Is there a sex difference in the ease of learning a second language? Are there identifiable personality traits that are related to sex and language learning?

7. What is the optimum number of children in a class learning a second language? (Twins and triplets learn the first language more slowly than singletons; would tutoring (1 child, 1 teacher) be the ideal arrangement at grade school level?)

8. All children with normal IQ and hearing learn to talk. What is a "language block"? What are the characteristics of children who learn a second language particularly easily or with particular difficulty?

9. What teaching techniques are most effective in teaching a child to hear sounds? to reproduce them?

10. What is the developmental sequence of the concrete-abstract dimension in first language learning? Is this sequence relevant to second language learning? Would, e.g., information about a child's level of categorizing and generalizing ability give us information regarding the best method of presenting the second language?

11. What is the pattern of development of the child's choices of categories - color, form, number, etc.? If a fairly general developmental sequence appears to occur, would it have any significance for second language learning?

12. Why are synonyms and antonyms confused? Is this related to perceptual difficulties?

13. Of what significance are personal affective relations between teacher and pupil in second language learning?

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SEMANTIC AND SYNTACTIC DEVELOPMENT

Developmental psychologists have studied language learning in the past as described in the preceding section. Only recently have they moved into aspects of language learning requiring greater linguistic sophistication. These aspects cover what is popularly conceived as grammar: morphology and syntax. These are the aspects of language which permit the child to create truly new utterances.

The two questions to be asked are 1) when do children learn the unstated rules of grammar of their native language? and, 2) how do children learn these rules?

Observers have noted the errors of children as evidence of the implicit formulation of a grammatical rule. "I goed" tells us much more about the child's learning than does the correct form, since the incorrect form is unlikely to be a simple imitation. The child who says, "The mouses are in their houses," is telling us something of the same sort. In diaries of child language this type of evidence from spontaneous utterances helps localize the rule being used by the child without requiring the child to verbalize the rule.

The limitations of naturalistic observational methods have been described before. Leopold (1937) deplores the quality of most diaries of child development, particularly in the area of language development, because of the poor linguistic background of the diarists. While Leopold's work on his own bilingual child is highly illuminating, the remarkably few errors made by the child, plus the added problem of bilingual development give us little normative data for judging the manner of learning grammar.

Jean Berko's (1958) experiment with preschool and first grade subjects attempts to discover how well young children know certain rules of morphology, pluralization, possession, verb and adjective inflection, and some derivational forms. Her technique is as important as her findings. She showed pictures to children of objects or persons labelled with nonsense words. The subject's answers to questions about the objects or persons with nonsense labels required the use of inflections, derivations and compounds built onto the nonsense words. In all the cases Berko used, young children tended to regularize irregular forms or to use the commonest form. By skillful sampling of stem words, Berko also found that children's improper regularization of words occurred even when the child had a correct model from which to extrapolate. It would appear that the most regular forms, being most frequent and therefore overlearned, provide the basic first rules for the creation of new utterances. This finding appears to hold for syntax as well as for morphology; it holds in Wolfle's study (see Miller, pp. 193-195) of morphology of artificial languages as well.

Again and again, the role of frequency and overlearning as the basis of extrapolation to new utterances appears in the literature. It would thus appear that to produce efficient second language learning, we should try to provide a parallel language "bath" for overlearning, unless we assume that compound language learning works advantageously. How to accomplish this without long years of exposure is the language teacher's problem. Here he trades on the maturational advantage of the older second language learner. Still, we can surmise that the mature second language learner cannot avoid the necessity for repetition and overlearning.

Block and Trager (1942) outline five kinds of morphological change in English: affixation (ful ending on noun creates an adjective: care---careful; ly on an adjective creates an adverb: careful---carefully); internal change (belief - believe) suppletion (entire base change: go-went); reduplication (papa, booboo); and zero modification (one sheep-two sheep). These are all areas of morphological learning that could be studied in English-speaking children, using the method of Berko.

What of syntax? Good psychological studies of syntactical knowledge of children are generally recent. From the earlier work of Heider and Heider (1940) we have evidence that children's sentences go from holophrastic sentences to phrases to simple sentences and then to the compound and complex sentence. The child is 10 or 11 before the compound forms overtake the simple in frequency. Linguists have reported this kind of sequence in languages other than English.

In English, sentence construction in oral language - particularly in speech addressed to children - is generally actor-action construction. This is "the favorite sentence type of English" according to Bloch and Trager (1942). It is typically this kind of sentence which is involved in English gobbledygook. The predictability of syntax and the cues in small function words help the listener to define new elements in utterances from context.

Porter (See Berko and Brown, 1960) asked a group of children between 7 and 13 years and a group of adults to find the word in some nonsense sentences analogous to a verb in a simple actor--action sentence. His purpose was to extract the cues used by these subjects in identifying the verb. Children use position, disregarding other cues; adults use position also, but can make use of form ending. The actor-action sequence function is the most regular, most frequent construction, so that any new English utterance is most probably decodable by position cues. Of interest is the finding that lexical meaning was used least; form properties appear more compelling than properties of meaning.

That form properties are learned quite well by young children is suggested by some recent studies. Roger Brown (1956) has found that 3 to 5-year-olds have begun already to identify verbs, particular nouns, and mass nouns. He found this by the intriguing technique of asking his subjects to identify a picture from a group of pictures which showed *x-ing*, *some-x*, and *the x*, x being a nonsense syllable. Ten of the 16 children chose a picture of movement when Brown used the nonsense word as a verb form; 11 of 16 picked out a picture of a discrete object for his particular noun; and 12 of 16 picked out an extending substance for his mass noun. Not all of the children have extrapolated (implicitly, of course) the rules for these form classes, yet all children at 3 to 5 use these form classes quite well. How the child differentiates these form-classes as parts of the phrase wholes he speaks is the interesting question. Carroll (1955) assumes he extracts the common properties from a tremendous number of phrase wholes he has learned. If we ever achieved such high level abstractions in a psychological experiment with young children, we would be amazed. Yet, because of the higher potency of life's reinforcement of child language and/or the very high frequency of language trials, the child rather quickly achieves this high-level abstraction and learns to talk like those around him.

Brown used these same children to test whether children of 3 to 5, in free association, followed the association pattern of adults. Most adults associate a response of the same form class as the stimulus. Brown found that subjects who used the form classes correctly in the experiment described above, tended to be those who free associated with responses of the proper form class ("homogeneously," to use Brown's term). The rank-order correlation between the two measures was +.84. Ervin (See Berko & Brown, 1960), earlier, had found that almost half of a sample of kindergarten and first grade children gave noun responses to noun stimuli in free association. Four of five sixth graders achieve the adult pattern of homogeneous association. Young children give more phrase responses than do older children.

A new approach to children's syntax, following the method of the linguist, is being tried currently by Brown and his co-workers at M.I.T. The aim is (unpublished report) to get a sequential record of early speech, in the same manner as the linguist obtains a corpus from an informant. From this record, the investigator learns what the sequences in a child's speech are, and eventually, what the child's implicit rules are. Brown has described a large set of utterances by a 25½ month-old child, using recurrent initial words to define classes of utterances available to the child. He has described seven classes of utterances, those following: that, there, see, is, Ø (no word), the, a. Associated with these initial utterances is a small group of nouns. See is the only explicit verb form, other than the utterance "that goin!" in the sample of utterances described in the preliminary results. While this method of gathering data is exceedingly time-consuming, it could provide us with the best data for answering the two questions raised at the beginning of this paper: When do children learn grammatical rules and how do they learn them?

A recent doctoral study by Paula Menyuk (1961) undertakes to describe the structure of the language of a sample of nursery school and first grade children, and to study the changes associated with maturation. Menyuk's purpose is to put Chomsky's model of syntactic structure to work in an effort to characterize child language. Chomsky's technique, as described by Menyuk, is to develop a sequential description of sentence structure of the changes--both structural and morphological--required to create new sentences from basic sentence structure.

Chomsky's model has three levels: 1) phrase structure, 2) transformation, and 3) morphology. Each level has sets of rules which permit the creation of new sentences at that level. Chomsky assumes the simple active-declarative sentence provides the first forms for sentences from which later forms are derived. The second level involves more complex sentences based on transformational rules. The third level involves the sequences of morphophonemic or inflectional rules.

Menyuk has studied the speech of a sample of very bright children, recorded in four situations: 1) spontaneous speech to the Blacky Pictures, a popular projective technique, readily usable with children; 2) conversation purposefully generated between the examiner and the child during the administration of the test; 3) conversation during peer interaction of three children, role-playing as a mother, father and child; and 4) classroom conversation and speech.

The fascinating results of Menyuk's study are that unique structures, not reflecting structures used by adults, are a surprisingly small part of children's speech by 3 years 6 months (the average of her younger group). All the basic structures adults use are already present in the speech of nursery school children, and are still being practiced and acquired at the first grade level. (The same child may say "I wanted" and "I washted".)

Maturation appears to be the most important variable associated with increased usage of syntactic structures, neither I.Q. nor sex being significant in Menyuk's sample. More first graders use the passive, the auxiliary have, the conjunctions if and so, and nominalize correctly than do nursery school children. However, significantly less than 100 % of first grade children have learned most of these structures. Summarizing, Menyuk reports a trend from omission in both phrase structure and morphology (he wash) to redundancy (he washted, the childrens), with decreasing fluctuation as maturation advances until usage of unique structures is eliminated.

Since Menyuk's careful analysis covers more than 6500 taped sentences plus more than 1000 sentences in the classroom, the results deserve attention, not only for what they tell us about a sample of bright children, but also for what they tell us of a new method of analysis based on Chomsky's model. Menyuk plans to extend her analysis to younger children. Such information is needed to localize and describe more closely the evolution of the transformational and inflectional rules.

The highly structured studies of Berko, Brown, and Porter suggest that form class concepts are available to young children. Of interest here is a study by Werner and Kaplan (1950) which suggests that when word meanings are gleaned from verbal context, form class cues are not used as one might expect. Context appears to be overpowering. Werner & Kaplan used 5 groups of subjects at yearly intervals between 8½ and 13½ years of age. Twenty-five children at each age level were given sets of sentences with a nonsense word embedded. After each sentence the child attempted a definition. The nonsense word is repeated through an entire set of sentences, each sentence giving, of course, more cues as to meaning. An example from their paper is as follows:

1. If you eat well and sleep well, you will hudray.
2. Mrs. Smith wanted to hudray her family.
3. Jane had to hudray the cloth so that the dress would fit Mary.
4. You hudray what you know by reading and studying.
5. To hudray the number of children in the class there must be enough chairs.
6. You must have enough space in the bookcase to hudray your library.

These average children showed some curious methods of defining. First, the word stood for the whole sentence. Next, the word became the whole sentence, overpowering the context, as it were. Then, there is holophrastic expansion, pluralized meaning from sentence to sentence, generalization by juxtaposition to parts of the sentence and chaining. The 10½ year-old shows a drop in sentence distortion, but the pre-10½-year-old's attempt to extract meaning is marked by the violence of his handling the grammatical structure of the sentence. While Brown assumes this is a function of memory span differences between children and adults, the sentences were available to the children for check during the process of defining. Brown suggests that Werner and Kaplan's Word Context Test produces verbal behavior that is similar to that of second language learning from context. If this is so, it appears to be a grossly inefficient process, since the child's methods are poor ones until fairly late: 10½ to 11½ years.

There are some questions we have been skirting in this seminar which have application to the learning of a second language. Implicit in much of the FLES literature is the notion that second language learning follows the pattern of first language learning. In fact, some writers in the language teaching field (Brooks, 1960) imply that second languages can be taught with maximum effectiveness only if the method used approximates the method of first language learning. This is echoed in the suggestion of Osgood and Ervin (1954) that coordinate learning of two languages minimizes interference, while compounding maximizes interference. No psychologist can help but respond with hearty endorsement of the FLES technique of practicing as much as possible in the language to be learned on the basis of simple practice effects alone. There are, however, some questions about the development of intuitive grammar that might be raised.

We are agreed that learning that objects, qualities, etc., have names need not be relearned. The advantages of categorization and the necessity of concept-formation are already built into the usual second language student through his experience with the first language. While a child formulates his rules implicitly in his first language, we have no evidence that rules or principles hinder second language acquisition. We have ample evidence that learning of principles enhances transfer value. What language teachers probably want is some combination of "verbal bath" and rules, not no rules at all. The curious wish that children should use intuition to formulate rules rests on two assumptions current in some educational circles: That the rule built out of high frequency of use will "stick" better, and that self-discovered rules are "better" than teacher-uncovered rules. One should be able to subject these assumptions to test.

How to approximate high frequency of exposure to a second language without living in the culture is a question that should be tackled. Needless to say, the 15- to 20-year learning period for language learning cited by Miller (1951) as the norm for first language learning is rarely open to the second language learner. How to speed up the process and develop rapidly some degree of verbal fluency in a second language will require much more investigation. The hope of seminars like ours is that new methods will not replace old ones only as a new "fashion," but rather that the new assumptions and new methods will provide hypotheses for testing how children learn and retain most readily.

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PSYCHOMETRICS IN SECOND LANGUAGE LEARNING

The psychometric problems in second language learning are varied and largely unsolved. The present paper is an attempt to point out the pertinent areas of psychometrics, to review progress in the field, and to suggest areas for further study.

The science of psychometrics can serve the second language learning field in a number of ways. Most obvious are tests of aptitude for second language learning and tests of achievement once some program of second language instruction has been instituted. In addition, psychometrics can serve an important function in the overall evaluation of a program of second language learning. Furthermore, it is highly probable that it is in some of the subtle areas of attitude measurement that psychometrics can make a most valuable contribution. Much depends upon the aims of a program of language instruction. A program which is based upon sight-reading skills in technical material must be evaluated quite differently from one which attempts to teach cultural values. It is also true that the psychometric tools for the evaluation of a program must change when the program is built upon the view of language taken by a linguist rather than by a classical grammarian.

Before reviewing some of the specific psychometric devices which are available, it is important to recognize that any psychometric device should possess four characteristics: standardization, objectivity, reliability, and validity.

The standardization of a test implies that suitable normative data are available for the test. Few teacher-made tests meet this criterion. Although a teacher may establish norms for a given test, these norms are limited severely by the students with whom the teacher has contact. In the classroom situation the repetition of a test year after year in order to establish norms poses additional problems. Students, at any rate students beyond the primary grades, quickly learn the details of tests used in this way. Certainly the establishment of informal norms should be encouraged in the classroom, but it is not to be expected that the procedure will reach the standards of a well-produced published test.

Among published tests in the field of second language learning there are many tests, probably a majority, which fail to reach the criterion of standardization. This is unfortunate because it leaves the user of the test without adequate means for interpreting the tests' raw scores. To be fully useful, the manual of a test should include adequate and suitable normative data. When a student is said to be at the 65th percentile in his knowledge of French, the population with which he is being compared must be known, adequate, and suitable. When a student is said to be at the 9th grade level in Spanish, more information about the meaning of this statement and how it was established must be available.

The objectivity of a test relates to the scoring procedure for the test. The correct answer to an item must be known by the scorer in advance and should be such that, upon rescoring, the item would always receive the same amount of credit. No serious problem is encountered with "objective test items" such as true-false, multiple-choice, etc. But it is a problem to be considered carefully should the testing involve the evaluation of tape-recordings or of classroom performance. Psychometricians desire objectivity in testing; however, the test maker must be ingenious enough not to let this goal distort the type of test items considered possible. In the field of second language learning, there is need for a more creative type of item than currently is found, but which still meets the requirement of objectivity--items which assess knowledge and skills of real importance. It is on this point particularly that the well-trained psycnometrician and the language expert must get together.

The term reliability refers to a technical concept which involves the ability of the test to measure consistently; it is the stability of a measuring device. Obviously no measuring device is very useful if it gives a variety of answers to a single question. Test makers, in order to assure reasonable reliability, must sample the abilities to be assessed rather widely. They must take care with the many details of the physical format of the testing procedure. The testing must be of sufficient length to permit a stable measure. Reliability is expressed by correlation coefficients which should be reported in the test manual. It is especially important that the type of population on which the reliability was established be reported. If the population is unduly heterogeneous, a suspiciously high reliability coefficient can result.

It is generally agreed that the validity of a test is its most important characteristic. The validity of a test expresses the extent to which the test measures what it is supposed to measure. The validity of a test is also expressed as a correlation coefficient: The correlation between the scores on the test and some external measure of the question which the test purports to be answering. Any validity coefficient is limited by the reliability both of the test and of the external criterion. As often as not, the limiting reliability coefficient is the one for the external criterion.

Validity is further subdivided by psychometricians into the following: concurrent validity, predictive validity, construct validity and face validity. As the name implies, in concurrent validity the test is correlated with some present assessment of a student's ability. For example, the scores on the College Board Examination in French might be correlated with the student's high school French course grade. Predictive validity is a correlation between a present test and some future measurement of performance. A simple example would be the correlation of the College Board scores in French with subsequent actual performance in French courses in college.

Construct validity has a more specialized meaning to psychometrists. Construct validity is the extent to which a homogeneous test measures the trait it purports to measure according to psychological theory. A test is homogeneous if it measures one trait and is not contaminated by the presence of measures of other traits. The trait which a homogeneous test measures is actually always in psychometrics a theoretical construct. This is true because psychological concepts are not directly observable but must be inferred from behavior. Examples of such theoretical constructs for which psychometrists might strive to develop homogeneous tests are: verbal intelligence, anxiety, and introversion. In second language learning such constructs might be auditory attention span, capacity for verbal flexibility, or insight into cultural connotation. The extent to which a homogeneous test of such a theoretical construct correlates with some external criterion is the test's construct validity.

If a test-maker seeks to maximize the construct validity of an instrument, the following steps would be taken in the development of the test. The ability or aptitude to be measured would be separated into its component parts; this is most commonly done by factor analysis. Factor analysis is a mathematical-logical process by which a complex or heterogeneous trait may be subdivided into "factors" which are relatively homogeneous or "pure" components. The process is never absolute; the factors are always only relatively homogeneous. However, in theory, the ability or aptitude to be assessed is considered to have been divided into its principal component parts; tests are then constructed to measure each of these parts. Again ideally, the ability or aptitude is measured completely by this series of homogeneous or factor-pure subtests. If an adequate external criterion can be found by which the success of this procedure can be measured, its construct validity can be established.

One very practical problem must be considered. It sometimes happens that a homogeneous test with high construct validity fails to have as high predictive validity as some other instrument which suffers from too great heterogeneity in the eyes of certain psychometrists. This problem area is one in which the test maker or psychometrician may find himself at odds with the expert in the area being measured or assessed. To use the area of a second language as an example, the psychometrician may be deeply concerned with the isolation of the principal component parts of some language ability, and he may succeed very well in devising tests to assess these component parts. The language expert, for his part, may desire a test of aptitude for second language learning, and he may judge the value of the test solely by its ability to predict success in second language learning. Each endeavor is clearly important and desirable scientifically. But the individuals involved must be aware of the differences in their aims.

Face validity is actually not a technical concept. It simply means the extent to which the person who selects the test or the person who takes the test is impressed that the test appears to be a valid instrument. A certain amount of face validity is often required to have a test accepted and used. There must be enough face validity to insure the cooperation of the persons taking the test. Obviously a test which appears trivial or irrelevant or which is insulting or threatening fails to gain such cooperation. However, the problem is sometimes an opposite one. A test may give every surface indication of being a sound instrument without this being the case. Put simply, what makes an administrator or teacher select a given test, or what secures the confidence of the test taker may or may not be the relevant criterion in the eyes of the psychometrist. Face validity is needed, but it is much less important than the other forms of validity.

Apart from the four characteristics of a sound test discussed above, a word should be said about the construction of individual test items, either for a standardized test or for the more informal teacher-made instrument. Well-constructed test items are not rapidly produced. Many items must be generated, tried on representative students, and analyzed statistically in order to obtain a pool of good ones. Trained psychometricians are usually required in the analysis of test items, but subject-matter experts who are aware of psychometric requirements are often needed to generate the items. The Educational Testing Service, in the production of tests such as the College Entrance Board Examination, has found it best to utilize the skills of both types of persons.

The individual classroom teacher will, of course, not have these resources at hand. However, many useful books in educational measurements can provide guidance. Anastasi (1961) gives a list of such textbooks, and her list appears in a separate section of the bibliography at the end of this paper.

Turning now from the characteristics of any good measuring device, to the current status of such devices in the second language learning area, we find that the most complete review of psychometric devices is that provided by the series of Yearbooks edited by Buros (1941, 1949, 1953, 1959). All but the most recent of the standardized tests are reviewed there by language experts as well as by psychometricians. These reviews, during the span of years covered by the Yearbooks, indicate considerable progress in the assessment of language learning when the achievement is in the field of vocabulary, grammar acquisition, and translation. These emphases in second language learning, which for many years were almost the only ones, have been well tested. Examples of such tests which have received generally favorable reviews in the Buros Yearbooks are: The Cooperative French Examination; The College Entrance Examination Board Achievement Tests; The Cooperative Spanish Test. Furthermore, the most recent College Entrance Examination Board Advanced Placement Examination, "French and the Cooperative French Listening Comprehension Test," receives relatively good reviews for its attempts to assess oral comprehension (Buros, 1959). There are still many problems to be solved, but oral comprehension tests which can be administered to large populations and can be machine scored are beginning to appear.

However, in general, the Yearbooks point up certain shortcomings in the testing of second language learning. There is a rather general lack of adequate standardization of many of the tests. This is especially true of the newer tests which may be promising, but whose value is limited by this lack. Another difficulty is the uncertainty of how to evaluate spoken or recorded language production. Such a shortcoming is obviously the result of the newness of tape-recording, language laboratories, etc. Imaginative work in this area is much needed. Generally there is a lack of psychometric devices which can assess language learning which emphasizes oral comprehension and speaking. However, some such devices do exist and will be reviewed in subsequent Yearbooks.

Dr. Nelson Brooks in a lecture given at Tufts University during the summer of 1961 reviewed recent progress in the linguistic program. For many years Dr. Brooks has written reviews in the Buros Yearbooks, and his evaluation is in order here to supplement the time since the most recent Yearbook, in which he expressed reasonable satisfaction with the tests available through the Modern Language Association for teachers and advanced students and the Modern Language Association Cooperative tests for high school students. He pointed out the need for further development in the FLES program and for instruction at the junior high school level. His own test of listening comprehension for FLES students is the outstanding example of progress in the field.

But there still remains a marked need for further tests of listening comprehension, and particularly for tests of speaking ability.

The recent emphasis upon spoken language makes tests of both comprehension and production essential. Putting tests of these abilities in paper-and-pencil form and developing efficient and reasonably economical methods of performance testing are the problems which currently occupy language psychometricians such as Brooks. Work in this area is being directed toward achievement and proficiency testing. Brooks said that at present program testing was best handled by the classroom teacher. Prognosis or aptitude testing did not appear to Brooks to be an outstanding need. His suggestion was for what psychometricians would call a "work sample," i.e., let the pupils try the FLES program and then use their success or failure in the early part of the program as one would use aptitude test data. Dr. Brooks is very critical of the outstanding aptitude test in second language learning, the Carroll and Sapon test (which will be discussed below). Basic to his criticism, as expressed in his lecture, is the fact that it was originally designed for adults and is obviously not suitable for the elementary school child. He is critical also of what he terms a monolinguistic approach to language testing.

To summarize the current status of achievement tests of second language learning, one might say that adequate tests of the classical grammar-and-translation-oriented courses exist and have existed for some time. Newer tests based upon oral-aural methods are beginning to appear and actually are reasonably good for the mature student. First steps only are now being taken with the FLES program. So far the most promising work for the FLES program is that of Nelson Brooks. In second language aptitude testing the outstanding test, the Carroll and Sapon, "Modern Language Aptitude Test" (Psychological Corporation) is still the subject of controversy.

Cronbach (1960, p. 320), an outstanding psychometrician, in his review of the Carroll and Sapon test introduces the rationale of such a test in so well-stated a manner that a direct quotation is in order.

> "About thirty years ago, numerous attempts were made to develop specialized aptitude tests for particular school subjects or curricula such as algebra, foreign language, engineering, or law. The test was usually prepared on the basis of a superficial analysis of the course of study. Test problems were based on the type of content to be encountered in the course (e.g., a foreign language test might involve substituting nonsense symbols for words in a sentence, a legal aptitude test would ordinarily present hypothetical problems in legal reasoning).

> "The tests of this first period have virtually disappeared. The primary reason is that the introduction of content specially relevant to the course of study did not raise validity appreciably above that which could be obtained with a good measure of general ability. When group tests began to provide separate scores for verbal, quantitative and later spatial and mechanical comprehension, these broader-purpose tests appeared to offer all the advantages of a special test for particular subjects. Prediction ordinarily can rest on either a general mental test, a verbal test, or a general proficiency test, although there may occasionally be an advantage in considering special abilities also.
>
> "When thorough psychological study is made of a type of of training which is of widespread importance, it may be possible to discover component abilities not covered in general ability tests. The best example is the Modern Language Aptitude Test of Carroll and Sapon (Psychological Corporation)."

The Carroll and Sapon test was developed for use with overseas personnel. The aptitudes assessed are derived from a factor analysis of language learning abilities. High construct validity as well as very satisfactory predictive validity have been reported for this test (Harding, 1959). In his excellent book, *A Study of Language*, Carroll (1953, p. 194) lists the following nine types of tests which should be developed, because they measure traits which promise to be predictive of second language learning:

> 1. Tests of the ability to mimic sounds and stretches of sounds. These tests would measure (a) the length of the "mimicry span"--as in tests of memory span-- and (b) the accuracy with which unusual sounds can be imitated. Attention would also be directed to the subject's accuracy or control in imitating patterns of stress and intonation.
>
> 2. Measures of speech style in native-language oral-production tests. For example, cohesiveness and directness of style can be evaluated in situations where the subject responds verbally to pictures, stories, etc.
>
> 3. Various dimensions isolated by factor analysis. The rote-memory factor and the various fluency factors would seem to be of particular promise.
>
> 4. Tests of phonetic discrimination. Some of these could be patterned after the well-known Seashore tests of musical ability.

5. Work-sample tests in learning oral production and aural comprehension of simple materials in a foreign language.

6. Measurements of the ability to persist in phonemically accurate utterances even when attention is directed to another aspect of the utterance.

7. Tests of the ability to imitate foreign accents.

8. Tests of flexibility in adapting to a foreign-language orthography.

9. Tests of the ability to develop meanings inductively.

The ideas for such a list were derived from the factor analysis of oral-production tests (Carroll, 1941) and from an insightful consideration of the psychometric literature.

The current *Modern Language Aptitude Test* of Carroll and Sapon attempts an assessment of a number of the abilities indicated in the above list. In terms of the task which the authors of the test set for themselves and from the validity coefficients obtained with the test in the context for which it was constructed, the *Modern Language Aptitude Test* must be termed a success. It is this type of approach to the problem of psychometrics in second language learning which promises the greatest potential for success to the psychologist. However, Brooks's point about the limitation of the test for evaluating the FLES program is well taken. Clearly there is a need for an approach similar to that of Carroll and Sapon for measuring aptitude for the FLES program. Furthermore, the same type of objective analysis of the components to be measured is needed also in the evaluation of the outcomes of programs such as FLES.

The final section of this paper will be devoted to suggestions and speculations about the direction research in psychometrics and second language learning might take in the future.

One question which requires a more definitive answer is the relationship between language ability and intelligence as measured by current tests. From the earliest days of mental testing it has been clear that almost all such tests rely to a considerable extent on the ability to comprehend and use language. The principal component in almost every test of intelligence is the ability to use abstract symbols. In fact, the best *single* estimate of a person's intellectual level is the size of his vocabulary. This is by no means the *only* good estimate, but if only one estimate is to be used, this one ability, the ability to master the vocabulary of a language, gives the highest correlation with the external criteria used for evaluating intelligence. Of course, one might wish to inquire about the criteria; the ones usually employed are three: increase in mental age with the chronological age of a child population; success in school; and scores on standardized tests.

Factor analysis of ability always isolates a variety of verbal factors, and if one considers the manipulation of non-verbal symbols to count in a sense as language, practically all of what we call intelligence consists of this broad ability with language.

When tests in the second language learning field were primarily tests of grammar, translation, and vocabulary acquisition, a good test of general intelligence worked well as an aptitude measure. However, with the advent of the oral-aural approach to second language learning the conviction has grown that a person of not marked abnormality can learn a language in time. There is, therefore, as pointed out by Cronbach (1960) a need for a new type of aptitude test. The unique abilities required in the early years by the FLES program must be isolated and assessed. Carroll and Sapon have not done precisely this. But their approach offers the best hope of success.

In addition to the need for an aptitude test for the FLES program, additional measures will be required to assure the value of this type of initial experience with a second language. Evaluation obviously must occur during and at the end of elementary school. But in addition, instruments to measure the longer range effects must be developed. As a suggestion of a possible direction such instruments might take consideration should be given to Osgood's work (1957) on the measurement of meaning. His technique, the Semantic Differential, is the first adequate multidimensional approach to an objective measure of meaning. An interesting possibility would be the adaptation of the Semantic Differential to answer the following question: Does a student who has been exposed to the oral-aural (linguistic) approach to a second language have a pattern of meanings closer to a native of the foreign country than does a student schooled in the more traditional language learning approach? If it is the true "feel" of a culture which is to be the goal of a new approach to language, measurement of this "feel" will be essential.

If one considers any learning situation to involve a change in the probability of the occurrence of certain events, and if one considers the goal of second language learning to be an authentic cultural insight, the measuring devices used to assess the extent to which this goal is reached should reflect changes in the probability of certain linguistic patterns, e.g., patterns of stress, adequate rejoinders, patterns of intonation, and syntactic construction.

A brief quotation from Pittenger (1957) may serve as a fitting conclusion to point up the need for creativity and insight in the development of the psychometric instruments of the future.

> "The patterns of usage of these phenomena are learned and shared by the members of a culture. These are dialect variations of patterns of usage. Just as we learn how and when to cry, we also learn to associate particular qualities of voice with particular kinds or patterns of events. We know too little about how and in what sequences the child learns these systems of communication. This is one important area of research.
>
> "Before the child is able to use the language, he can be heard imitating or reproducing sounds in sequence, using various elements of tone of voice. It seems evident that more primitive or earlier learning may be accomplished in the tone of voice area of communication. This suggests that tone of voice may be more closely linked to the physiological-emotional responses than the later acquired, more abstract communication of language. Language, on the other hand, is more closely linked to those "logical" processes we call thought.
>
> "The learning done in the area of language is subjected to much pedagogical scrutiny and correction, while it appears that the learning of tone of voice is subjected to less, and perhaps much less, conscious deliberate correction toward conformity to the secondary processes of thinking.
>
> "It may prove to be demonstrable or observable that the areas of communication subjected to the most formal learning and teaching more consistently conform to the rules of secondary process thinking. If so, it may also be observable that the voice of the unconscious or the communication of primary process thinking may be most evident and studyable in the other areas of communication; namely, in kinesics and tone of voice."

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RESEARCH ON FOREIGN LANGUAGE INSTRUCTION

In the eyes of many a modern linguist, any research on foreign language teaching prior to 1940 might as well be totally disregarded. The linguist who takes such a view does not happen to be as wrong as he sounds, simply because a veritable revolution has taken place in language instruction during the past two decades. What the linguist may fail to recognize is that early research may be quite empty of good suggestions for modern teaching and yet offer all sorts of helps for the advancement of research itself. Classroom experimentation could not possibly be even the rudimentary science that it is today if it had not developed little by little, in a somewhat molar fashion, and over a protracted period of time. Whether brand new or already dated, it is a rare language experiment indeed which makes no mention at all of just those troubles and frustrations which seem bound to crop up whenever educational research is undertaken. The experiences of Coleman (1934, p. 150) and Birkmaier (1949, p. 181) are cases in point. Both of those language professors were unquestionably research-minded. Since they were working some fifteen years apart, at least a few of their basic assumptions were well nigh contradictory, but so far as classroom experimentation went what plagued them both was one and the same trouble: the blunt refusal of control teachers to cooperate!

Of late, Coleman (1934) has been accused of extreme shortsightedness for his advocacy of reading as the only realistic and achievable goal, given but two years for language study. No matter whether the primacy of reading was a good or a poor thing to emphasize, over the decades Coleman's remarks concerning the difficulties of language research have proved to be as prophetic as they were pessimistic:

> Indeed, one is confronted by the somewhat melancholy reflection that experimentation in modern-language teaching, in cases where a number of teachers and of schools are involved, has not yet been proved possible, whether because of the failure of pupils to continue in the subject for a suitable period, or because the lack of complete cooperation by participating teachers or the non-attendance of pupils wrecks the testing program, or because adequate control groups throughout the experimental period cannot be found. (Coleman, 1934, p. 188)

Despite such melancholy reflection, it was in the decades just prior to World War II that a small number of language professors, psychologists, and educationists first attempted research in language instruction and worked together at least as harmoniously and as productively as their modern-day counterparts yet have. Who were these language professors and what did they do that was so different? Not just Coleman but Bond (1953), Cheydleur (1931), Young and Vander Beke (1926) were all pioneers. Pioneers in a double sense, too. First, as proponents of the silent-reading method of learning foreign languages, and perhaps even more memorably, as the earliest champions of the objective measurement of language achievement. Instead of being smugly content with their new credo, these particular linguists began to state specific hypotheses, they came to understand why equated groups were necessary, whenever possible they provided pre- and post-tests, they kept detailed records of their experiments, and when differences in results were not found to be significant the printed record shows that they yielded quite as graciously as modern researchers do to the statistical denial of perhaps their fondest hopes. All of these good habits were the very makings of research, as is still the case.

Research Prior To 1940

At the University of Iowa, Young and Vander Beke (1926) divided a population of 294 first-year French students into six experimental and six control groups. For them, an experimental group signified one learning French through the silent-reading method rather than through classroom translation. Since their results gave critical ratios varying from four to thirteen favoring the experimental groups on locally-made tests of vocabulary, grammar and comprehension, the reading method was believed to have been established as markedly superior. But two years later, Cheydleur (1931) conducted a similar experiment at Wisconsin with 102 students divided into six sections (roughly equivalent) according to academic achievement. The fact that he was able to use nationally standardized language tests rather than home-made ones may help to explain his reverse findings of only a single point's difference in the means of "equated" groups.

The Milwaukee Experiment (1930) which so discouraged Coleman was conducted over a two-year period and involved 225 students drawn from several different high schools of the city. Groups in beginning French were equated for intelligence and after a single semester those students who had been taught by the silent reading method, as opposed to more conventional grammar-translation methods, were found to be about normal in vocabulary as measured by standardized tests. However, they were shockingly low in grammar and considerably below national norms in reading comprehension! But what hurt this experiment the most was that the control teachers refused to give any tests in June even though their own students had scored so much above the reading-method classes in January. Research be damned, was there ever a more dramatic case of quitting when ahead! Although substitute control classes were finally mustered up for the second year, to all intents and purposes the Milwaukee Experiment had been wrecked.

Whenever these earliest proponents of massive reading deliberately set out to show the superiority of their method, more often than not, their findings tended to be inconclusive. Ironically enough, however, about a decade later, whenever enthusiasts for audio-lingual methods came to put their own oral practices to as rigorous tests, in such competition, the abiding strength, if not the superiority, of the reading method usually became apparent not just for vocabulary and reading comprehension as one might perhaps expect, but even for aural comprehension as well.

By analyzing the records of several thousand students at the University of Chicago, Bond (1953) found, long before he came to publish, that (1) the college freshman who had studied a foreign language for only a single year at the high school level lost whatever advantage he may have had before the end of his first college year, and (2) that the typical college student who had studied a language for two years before undertaking language work in college met with more success than the person who began the study of a foreign language in college.

Buswell's laboratory experiment (1927), wherein he photographed and analyzed the eye-movements of subjects engaged in reading a foreign language silently, hardly needs to be replicated, but the proponents of FLES might well quote his findings more often than they now do, when called upon to justify their deliberate delay in teaching children to read the foreign language. Admittedly, the possible adverse effect of premature reading upon oral speech habits is the more compelling argument for a delay, but Buswell also demonstrated that learning to read a foreign language was a much harder job for a child than for an adolescent or an adult. Whereas eye-movements were about the same for subjects of all ages as they read English, fourth and fifth grade school children made many more fixations and regressions when they undertook to read any foreign language which they were learning.

Although The Encyclopedia of Educational Research, 1960 Edition, is impressively accurate in most matters, its treatment of the research of Forlano and Hoffman (1937) is totally unreliable. The Encyclopedia quite erroneously states: "Forlano and Hoffman compared a method in which students were required to guess the meaning of unknown Hebrew words from the context with one where students were immediately told the meaning. The former was significantly better for both immediate and delayed recall; however, the amount of time was not controlled" (p. 678). For the sake of correction, the following statements are taken directly from the cited publication of Forlano and Hoffman (1937, p. 635): "It must be borne in mind that the present experiment was concerned with learning the meaning of a list of isolated words, not new words encountered in context." "We may conclude from our results that in teaching the meanings of a list of words of a foreign language it is better to tell the correct meaning immediately without allowing the learner to guess a possible wrong meaning" (p. 635). And "The time taken in each experimental session was about an hour" (p. 633).

1940-1950

Since the ASTP failed to conduct experimental research, whatever scientific comparisons could be made between the audio-lingual and traditional methods of foreign language instruction had to await the termination of World War II. After first developing a standardized test of aural comprehension, Agard and Dunkel (1948) made as systematic a study of these contrasting methods as was possible in a very large-scale but loosely controlled inquiry. Upon the basis of data collected from seven colleges and one high school not stressing the oral method as compared to data collected from eight colleges and three high schools stressing aural-oral skills, these reviewers (1) contradicted the assumption "that aural-oral competence automatically creates reading ability and that consequently the latter need not be specifically taught" (p. 291), (2) found that "superior reading skills were developed in those programs where reading received the greatest time and emphasis" (p. 291), and (3) concluded that "aural-oral and reading proficiency constitute separate, independent skills which do not develop one from the other but rather only from direct training in each separately" (p. 291).

Birkmaier (1949) conducting an experiment with classes in beginning German at the University of Minnesota tested several hypotheses regarding two different teaching methods. Two conversation classes embracing a final total of 39 students were compared with five classes of 92 students taught by an eclectic method. Intelligence and foreign language aptitude as measured by Iowa Placement Tests were used in matching groups. Standard post-tests of reading comprehension, vocabulary and functional grammar were given. Scores for aural comprehension were also determined, but since the teachers of control classes refused to cooperate, tests of oral production could not be given. At the .01 level of significance, Birkmaier found no difference in vocabulary scores between eclectic and conversational methods, no differences in reading test scores, and a difference in grammar scores (for boys only) favoring the eclectic method. As expected, there was a significant difference on aural comprehension tests in favor of the conversational method. In a later study, not to be reported here in detail, Birkmaier (1949) also found a statistically significant difference in oral production scores, which were superior for a small number of students taught by the conversational method as compared to equally small numbers taught by either the silent-reading method or by the eclectic method.

In yet another comparison, Hohlfeld (1950) made a study of 28 pairs of beginning Spanish students whom he taught by contrasting methods, one making use of recordings and emphasizing oral skills more than the other. Students who had been matched in respect to 17 variables were measured by standard achievement tests and a locally-constructed oral reading test, after eight weeks and again after 32 weeks of instruction. Differences in scores for the two groups were statistically insignificant on all parts of the Cooperative Spanish Test. Statistically significant differences favoring the audio-lingual method did appear in the scores emanating from Hohlfeld's own test of oral production.

Prior to 1950, research was undertaken at the University of Texas to determine both the possible advantage of one method of teaching grammar over another and whether specific instruction in articulatory phonetics actually paid dividends during early instruction in French and Spanish. As many as 2700 students were involved but in their publication, Hamilton and Hadon (1950) did not make clear what procedures had been used to equate groups. Neither did they present statistical data to support these announced findings: (1) that neither an audio-lingual teaching method nor a more conventional and eclectic method made any appreciable difference in the attainment of grammar, (2) that instruction in articulatory phonetics does make a difference in oral skills and, (3) that phonetic symbols are an assistance to a person learning French but are unnecessary in Spanish.

1950-1960

From 1950 to 1960, research in language teaching tended to shift from broad scale comparisons of different methods to classroom situations involving either single variations or a limited number of variations in instruction. In a laboratory experiment, Richards and Appel (1956) attempted to measure the effect of visually presented words upon oral skills in Spanish. Fourteen pairs of college students were equated as to I.Q., sex, age, and number of years of previous instruction in a foreign language other than Spanish. These students were given pre-tests of linguistic aptitude, followed by five hours of instruction and one hour of testing over a three week period. The experimental group was taught by a purely aural, the control group by an aural-plus-vision method. Post-tests for achievement in vocabulary revealed only negligible differences. But, as had been predicted, the experimental group obtained significantly better scores (.04 and .03 levels) on the oral reproduction and the pronunciation tests.

Pickrel, Neidt and Gibson (1958) attempted to determine how junior high school Spanish classes taught by tape-recordings under the control of teachers who knew no Spanish would compare with a class taught by a trained teacher of Spanish.

Performance by each of four classes taught by tape-recorder was compared to one taught by the teacher of Spanish. Through analyses of variance and covariance a statistically significant difference in favor of the class taught by the Spanish teacher was found in three of the four comparisons.

Carroll (1959) attempted to measure the difference which the provision of a language laboratory may have made between 29 high school students of second-year French and an equal number of their immediate predecessors who had been given only limited access to a language laboratory. The control variables were I.Q. and oral language aptitude. Significant differences did not appear in the scores for listening comprehension or for reading. However, tests of vocabulary and grammar revealed significant differences favoring the non-laboratory group. The fact that the non-laboratory class had received much oral instruction may explain why laboratory practice seemed not to have made any difference in auditory comprehension.

As yet, experimental studies regarding FLES are very limited in number. In a follow-up study of 100 pupils who had received FLES instruction in two schools of New York City, Justman and Nass (1956) were unable to show that the provision of FLES had made any statistically significant difference in their high school French grades. The provision of FLES was found to have made a statistically significant difference in subsequent Spanish grades but for the first term of high school instruction only.

Dunkel and Pillet (1957) published an evaluation of the FLES program at the University of Chicago campus school. In this school, foreign language instruction is made available to unselected pupils from grade three upward. Besides reporting that, no matter what their intelligence, about ten percent of all children have pronounced difficulty in acquiring a second language, Dunkel and Pillet made statements as follows:

> ...The oft-implied opinion that youthfulness automatically and universally produces foreign diction so perfect as to be mistakable for that of a native speaker must be considered pure fiction. Though the general level of accuracy is high and few of the children sound exceptionally bad, an equally small number sound exceptionally good (p. 23).

Garry and Mauriello (1960) seem to be the only ones who have attempted a quantified evaluation of televised instruction in French at the elementary school level. After screening out bilinguals and distributing children with poor auditory discrimination randomly, 1600 elementary school pupils in Metropolitan Boston were asked to make oral responses to questions and engage in dialogues, all of which were recorded on tapes for scoring purposes. The factor of intelligence was controlled. Findings which seemed most pertinent to this reviewer were that (1) fluency of teachers made a statistically significant difference in the fluency of pupils, and (2) oral practice with a teacher, whether she was fluent or not, produced better oral results than repeated auditions of the televised lessons, though the difference was not statistically significant.

Some Queries and Suggestions

Until some standardized and readily scoreable test of oral production can be developed, any broad-scale experimentation involving all the oral skills, if possible at all, is bound to be prohibitively expensive of time and human effort. Yet, the need for just such a measuring instrument intensifies as audio-lingual techniques are themselves modified and refined. Are oral innovations to be quickly adopted and perhaps as quickly sloughed off without any objective evidence as to whether they are better or worse than those practices which they supplant?

Apart from Birkmaier, nobody seems to have tried to determine whether the method by which one learns a second language has any direct relationship to length of retention. At all levels of education, and for all subjects, we need to ask not only what a student has learned but also for how long!

At the FLES level, would it be appropriate to try to investigate the possible differences which may develop when words or concepts are learned somewhat independently and from context as opposed to being told meanings?

At the FLES level might it not also be appropriate to try to compare a teaching method which prompts, or perhaps even over-prompts, in order that mistakes in first pronunciation may be reduced as opposed to one which emphasized reinforcement, positive or negative, after pronunciation?

How accurately can students of foreign languages at the different age levels both identify and diagnose their own oral errors when they hear them through feed-back? Unless this skill proves to be both measureable and teachable, there is considerable risk that language laboratories may become large-scale and highly efficient operations for the practice of error!

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